Restricted **Serial** 1071

MODEL YG-1
HOMING BEACON EQUIPMENT

PRELIMINARY INSTRUCTIONS

Manufactured for
U. S. NAVY DEPARTMENT—BUREAU OF SHIPS
by
STEWART-WARNER CORPORATION
Chicago, Ill., U. S. A.

CONTRACT NXss-19219

Preliminary
Form 11137

Restricted Serial 1071

MODEL YG-1

HOMING BEACON EQUIPMENT

INSTRUCTIONS

This instruction book is furnished for the information of commissioned, warrant, enlisted and civilian personnel of the Navy whose duties involve design, instruction, operation and installation of radio and sound equipment. The word "RESTRICTED" as applied to this instruction book signifies that this instruction book is to be read only by the above personnel, and that the contents of it should not be made known to persons not connected with the Navy.

NOTICE

IN SOME CASES IT HAS BEEN FOUND NECESSARY TO MAKE SUBSTITUTIONS OF ORIGINAL MATERIALS. HOWEVER, ALL NECESSARY FACTORS HAVE BEEN MAINTAINED, SO THAT REPLACEMENTS CAN BE MADE, AND WHEREVER SPARE PARTS ARE INVOLVED IN THE SUBSTITUTIONS, THE SPARES ARE IDENTICAL TO THE PARTS MOUNTED IN THE EQUIPMENT. IF IT IS FOUND THAT THE LATTER CANNOT BE MET, SPECIAL INSTRUCTIONS WILL BE ISSUED AND SUPPLIED FOR ALL SHIPMENTS SO AFFECTED.

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MEDICAL DEPARTMENT
UNITED STATES NAVY

(DIVISION OF PREVENTIVE MEDICINE)
1942

ELECTRIC SHOCK
FIRST-AID TREATMENT

SAFETY FIRST Regard electrical apparatus generally, and especially all current-carrying parts, as dangerous, irrespective of voltage. Exercise great care in handling, and avoid broad contacts such as are made by standing on a metal deck or in water.

Dangerous contact may result through lessened resistance when the skin and clothing are wet with perspiration. Contact with damp metal surfaces—decks, bulkheads, guns, machinery—may allow the current to ground through the moist skin and body.

Electric shock is due to current passing through the body—current actually passing—irrespective of the voltage. A pressure as low as 110 volts has caused death. Current passing through the body in the region of the heart is especially dangerous. In using electric breast drills avoid the possibility of a ground.

Usually electric shock does not kill instantly. Life can often be saved even though breathing has stopped.

I. FREE THE VICTIM FROM THE CIRCUIT IMMEDIATELY.

Use a dry nonconductor (rubber gloves, clothing, rope, board) to move either the victim or the wire. Beware of using metal or moist material.

Shut off the current.

If necessary to cut a live wire, use an ax or hatchet with a dry wooden handle; turn your face away from the electrical flash.

II. ATTEND INSTANTLY TO THE VICTIM'S BREATHING.

Begin resuscitation at once on the spot. Do not stop to loosen clothing; every moment counts.

RESUSCITATION BY THE PRONE PRESSURE METHOD OF ARTIFICIAL RESPIRATION

GAS ASPHYXIATION **ELECTRIC SHOCK** **DROWNING**

Waste no time. When the patient is removed from the water, gas, smoke, or electric contact, get to work at once with your own hands. Send for the medical officer or nearest physician.

No reliance should be placed upon any special mechanical apparatus, as it is frequently out of order and often is not available when most needed. The patient's mouth should be cleared of any obstruction such as chewing gum or tobacco, false teeth or mucus, so that there is no interference with the entrance and escape of air.

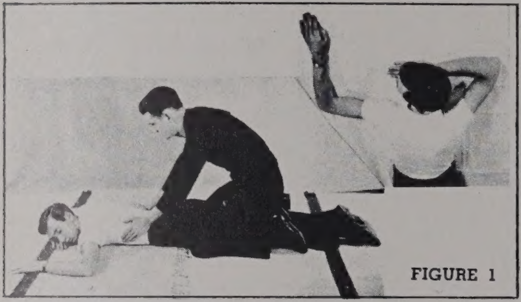

FIGURE 1

POSITION

1. Lay the patient on his belly, one arm extended directly overhead, the other arm bent at elbow and with the face turned outward and resting on hand or forearm, so that the nose and mouth are free for breathing. (See Inset, fig. 1.)

2. Kneel straddling the patient's thighs with your knees placed at such a distance from the hip bones as will allow you to assume the position shown in Figure 1.

Place the palms of the hands on the small of the back with fingers resting on the ribs, the little finger just touching the lowest rib, with the thumb and fingers in a natural position, and the tips of the fingers just out of sight. (See fig. 1.)

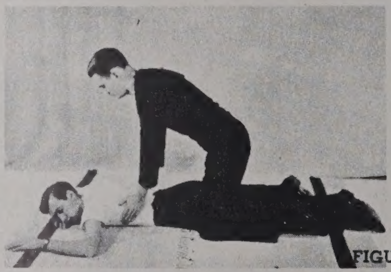

FIGURE 2

FIRST MOVEMENT

3. With arms held straight, swing forward slowly, so that the weight of your body is gradually brought to bear upon the patient. The shoulder should be directly over the heel of the hand at the end of the forward swing. (See fig. 2.) Do not bend your elbows. This operation should take about two seconds.

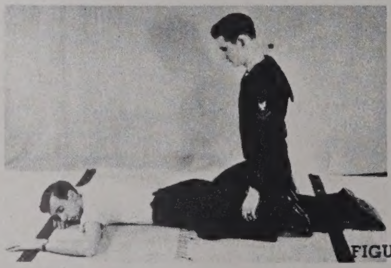

FIGURE 3

SECOND MOVEMENT

4. Now immediately swing backward, so as to remove the pressure completely. (See fig. 3.)

5. After two seconds, swing forward again. Thus repeat deliberately twelve to fifteen times a minute the double movement of compression and release, a complete respiration in four or five seconds.

6. Continue artificial respiration without interruption until natural breathing is restored. Do not get discouraged at the slow results that sometimes happen when resuscitating the apparently drowned. Efforts often have to be continued a long time before signs of life are apparent. Do not discontinue the efforts until certain that all chance is lost. Sometimes, even after several hours' work, recovery takes place.

7. As soon as this artificial respiration has been started and while it is being continued, an assistant should loosen any tight clothing about the patient's neck, chest, or waist. TO KEEP THE PATIENT WARM DURING ARTIFICIAL RESPIRATION IS MOST IMPORTANT AND IT MAY BE NECESSARY TO COVER HIM WITH BLANKETS AND WORK THROUGH THEM, AS WELL AS TO APPLY HOT-WATER BOTTLES, HOT BRICKS, ETC. Do not give any liquids whatever by mouth until the patient is fully conscious.

8. To avoid strain on the heart when the patient revives, he should be kept lying down and not allowed to stand or sit up. If the doctor has not arrived by the time the patient has revived, he should be given some stimulant, such as one teaspoonful of aromatic spirits of ammonia in a small glass of water or a hot drink of coffee or tea, etc. Continue to keep the patient warm and at rest.

9. Resuscitation should be carried on at the nearest possible point to where the patient received his injuries. As a general rule he should not be moved from this point until he is breathing normally of his own volition and then moved only in a lying position. Should it be necessary, due to extreme weather conditions, etc., to move the patient before he is breathing normally, resuscitation should be carried on during the time that he is being moved.

10. A brief return of natural respiration is not a certain indication for stopping the resuscitation. Not infrequently the patient, after a temporary recovery of respiration, stops breathing again. The patient must be watched, and if natural breathing stops, artificial respiration should be resumed at once.

11. In carrying out resuscitation it may be necessary to change the operator. This change must be made without losing the rhythm of respiration. The relief operator should kneel behind the one giving the artificial respiration and at the end of the movement, the operator crawls forward while the relief takes his place. By this procedure no confusion results at the time of change of operator, and a regular rhythm is kept up.

PRACTICE IN THE PERFORMANCE OF ARTIFICIAL RESPIRATION ON A VOLUNTEER SUBJECT SHOULD BE OBTAINED BY EVERYONE.

SAFETY

OPERATION OF THIS EQUIPMENT INVOLVES THE USE OF HIGH VOLTAGES WHICH ARE DANGEROUS TO LIFE. OPERATING PERSONNEL MUST AT ALL TIMES OBSERVE ALL SAFETY REGULATIONS. DO NOT CHANGE TUBES OR MAKE ADJUSTMENTS INSIDE EQUIPMENT WITH HIGH VOLTAGE SUPPLY ON; ALWAYS SHUT DOWN MOTOR GENERATORS OR OTHER ASSOCIATED POWER EQUIPMENT AND OPEN MAIN SWITCH IN POWER SUPPLY CIRCUIT. UNDER CERTAIN CONDITIONS, DANGEROUS POTENTIALS MAY EXIST IN CIRCUITS WITH POWER CONTROLS IN THE OFF POSITION DUE TO CHARGES RETAINED BY CAPACITORS, ETC. TO AVOID CASUALTIES, ALWAYS DISCHARGE AND GROUND CIRCUITS PRIOR TO TOUCHING THEM.

Since the use of high voltages which are dangerous to human life is necessary to the successful operation of the radio transmitting equipment covered by these instructions, certain reasonable precautionary measures must be carefully observed by the operating personnel during the adjustment and operation of the equipment.

The major portions of the equipment are within shielded enclosures, provided where necessary with access doors. These doors are **not** equipped with interlock switches and operating personnel are cautioned to remove all power from the equipment before opening access doors.

KEEP AWAY FROM LIVE CIRCUITS—Under no circumstances is any person permitted to reach within or in any manner gain access to the enclosure with power supply line switches to the equipment closed; or to approach or handle any portion of the equipment which is supplied with power, or to connect any apparatus external to the enclosure to circuits within the equipment; or to apply voltages to the equipment for testing purposes while any portion of the shielding or enclosure is removed or open. Wherever feasible in testing circuits, check for continuity and resistances rather than directly checking voltage at various points.

THE ATTENTION OF ENGINEER OFFICERS, RADIO OFFICERS AND OPERATING PERSONNEL IS DIRECTED TO BUREAU OF ENGINEERING CIRCULAR LETTER NO. 5a OF OCTOBER, 1934, OR SUBSEQUENT REVISIONS THEREOF ON THE SUBJECT OF "RADIO-SAFETY PRECAUTIONS TO BE OBSERVED."

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GUARANTEE: 2 YEARS, 1 YEAR SERVICE

The equipment, including all parts and spare parts, except vacuum tubes, shall be guaranteed for a service period of **one year** with the understanding that, as a condition of this contract, all items found to be defective as to design, material, workmanship or manufacture shall be replaced without delay and at no expense to the Government, provided that such guarantee and agreement shall not obligate the contractor to make replacement of defective material unless the failure, exclusive of normal shelf life deterioration, occurs within a period of two years from the date of delivery of the equipment to and acceptance by the Government, and provided further, that if any part or parts (except vacuum tubes) fail in service or are found defective in ten percent (10%) or more, but not less than two, of the total number of equipments furnished under the contract, such part or parts, whether supplied in the equipment or as spares, shall be conclusively presumed to be of defective design, and as a condition of contract subject to one hundred per cent (100%) replacement of all similar units supplied on subject contract by suitable redesigned replacements. Failure due to poor workmanship while not necessarily indicating poor design, will be considered in the same category as failure due to poor design. Redesigned replacements which will assure proper operation of the equipment shall be supplied promptly, transportation paid, to the Naval activities using such equipment, upon receipt of proper notice and without cost to the Government. All defective parts originally furnished under contract shall be held subject to rejection and return to the contractor.

This period of two years and the service period of one year shall not include any portion of the time that the equipment fails to give satisfactory performance due to defective items and the necessity for replacement thereof, and provided further, that any replacement part shall be guaranteed to give one year of satisfactory service.

REPORT OF FAILURES

Report of failure of any part of this equipment, during its service life, shall be made to the Bureau of Ship's in accordance with current instructions. The report shall cover all details of the failure, and give the date of installation of the equipment. Refer to the latest revision of Bureau of Ships Circular Letter No. 40 for instructions concerning Reports of Failures, etc.

PERTINENT DATES AFFECTING REPLACEMENTS

Contract No. .... Date of Contract ....

Serial number of equipment ....

Date of acceptance by the Navy ....

Date of delivery to contract destination ....

Date of completion of installation ....

Date placed in service ....

Blank spaces in the book shall be filled in at the time of installation. Operating personnel shall also mark the "date placed in service" on the plate located below the model nameplate on the equipment.

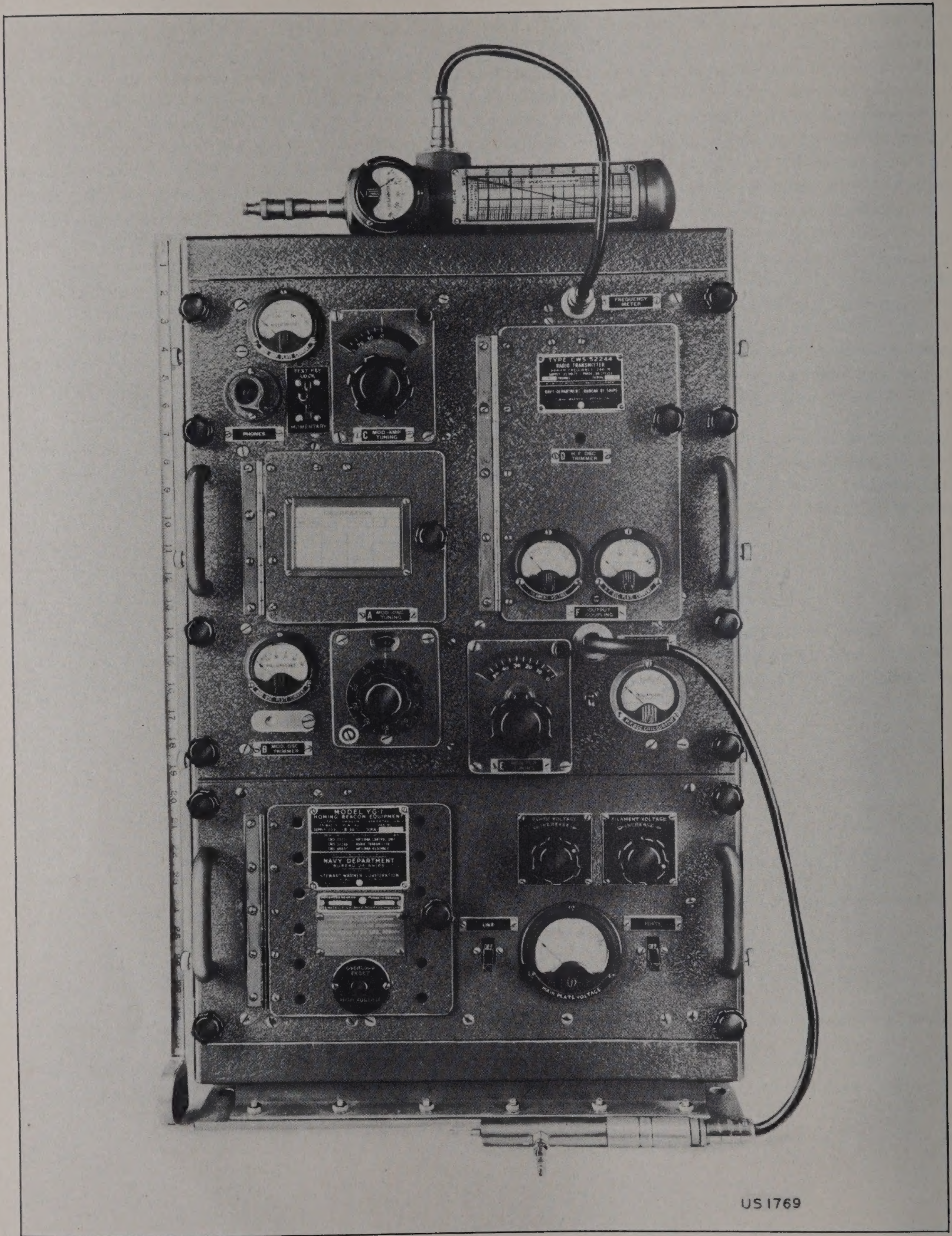

FREQUENCY METER
TEST KEY LOCK
MOMENTARY
PHONES
C MOD.-AMP TUNING
TYPE CWS-52244 RADIO TRANSMITTER
NAVY DEPARTMENT BUREAU OF SHIPS
D H.F. OSC TRIMMER
A MOD.-OSC TUNING
F OUTPUT COUPLING
B MOD. OSC TRIMMER
E
MODEL YG-1 HOMING BEACON EQUIPMENT
NAVY DEPARTMENT BUREAU OF SHIPS
STEWART-WARNER CORPORATION
PLATE VOLTAGE INCREASE
FILAMENT VOLTAGE INCREASE
LINE
PLATE
MAIN PLATE VOLTAGE
OVERLOAD RESET
HIGH VOLTAGE
US 1769

Figure 1—Radio Transmitter and Frequency Meter: Model YG-1 Radio Beacon Equipment

I

INTRODUCTION

1.1 The Model YG-1 Homing Beacon Equipment is designed for use on aircraft carriers or at air fields to provide a "homing" signal in all directions for the guidance of returning aircraft. The directional, rotating antenna radiates a differently coded, modulated continuous wave signal through each of twelve sectors composing a 360 degree area. During every tenth cycle of rotation of the antenna, the station identification signal is transmitted. The carrier frequency may be selected from the range between 241 and 251 megacycles, but normally is intended to be 246 megacycles. The keyed modulating frequency may be selected from the range between 540 and 830 kilocycles. The equipment is designed for operation from a 115 volt, 50 to 60 cycle, a-c power source. Its power output is 25 watts.

II

EQUIPMENT

2.1 This Homing Beacon Equipment consists of the following items:

Item	Height (Inches)	Width (Inches)	Depth (Inches)	Weight (Pounds)
1 CWS-52244 Radio Transmitter	$31\frac{5}{8}$	21	$21\frac{9}{32}$	187
1 CWS-23271 Antenna Control Unit	$13\frac{3}{4}$	$16\frac{1}{2}$	$10\frac{3}{16}$	75
1 CWS-66037 Antenna Assembly	$43\frac{15}{16}$	$46\frac{7}{8}$	$47\frac{5}{8}$*	152
1 CWS-60028 Frequency Meter	$6\frac{11}{16}$	$18\frac{1}{4}$	$8\frac{5}{8}$	$18\frac{1}{2}$
1 Spare Parts Box Containing Spare Parts and Spare Tubes for Transmitter	9	18	12	
1 Spare Parts Box Containing Spare Parts for Antenna Control Unit and Antenna Assembly	9	18	12	
1 Set of Transmission Line (140 ft.) and Accessories				
1 Set of Signal Disc Accessories Comprising a Set of Station Identification Inserts, and 4 Completely Assembled Bearing Signal Cams in Special Container				

* Clearance required for antenna swing.

2.2 The vacuum tubes used in this equipment consist of the following:

1	Type –807	Modulator-Oscillator
1	Type –807	Modulator-Amplifier
2	Type –8025	Carrier-Oscillator
1	Type –6SA7	Monitor-Converter
2	Type –836	Power-Supply Rectifier

III

DESCRIPTION

3.1 GENERAL DESCRIPTION—Each equipment includes four major units. The Radio Transmitter contains the r-f transmitter and modulator, the modulation-frequency monitor, and the d-c power-supply for these sections. The Antenna Control Unit contains the keying components, and the synchronizing mechanism which correlates the transmitted code signal and the direction of transmission of that signal (i.e., the orientation of the antenna). The Antenna Assembly includes the antenna array and the antenna-rotating mechanism. The Frequency Meter consists of a wave meter with an indicating microammeter, and is connected to the transmitter only at those times when it is desired to check or adjust the carrier frequency. Heaters are provided in the power supply section of the radio transmitter, in the antenna control unit and in the antenna assembly. These may be placed in operation to prevent condensation of moisture within the equipment when the ambient temperature becomes low.

3.2 This general description of the operation of the equipment should be followed on the functional block diagram, Figure 40. A Type –807 beam-power tetrode, functioning as the modulator-oscillator, supplies r-f energy at any selected frequency between 540 and 830 kilocycles. This signal is amplified by the Type –807 modulator-amplifier tube, and is then applied to modulate the carrier. The oscillator and amplifier are keyed from the antenna control unit by means of cam-actuated contacts. The 246 megacycle carrier is generated in the carrier-oscillator by a pair of Type –8025 tubes, connected in a push-pull circuit arrangement. The modulated output of the carrier-oscillator is conducted by a concentric transmission line to the antenna, from which the signal is radiated. The antenna control unit synchronizes the keyer cam rotation with the rotation of the antenna so that the correct signal is transmitted by the equipment during its rotation through the corresponding circle sector. Plate voltage is supplied to the various sections of the transmitter from the power supply section.

3.3 A portion of the output of the modulator is supplied to the monitor, in which a Type –6SA7 tube is used as an oscillator and detector. The oscillator circuit is tuned so as to produce an audible beat note between the two signals, which is then detected and fed to a set of headphones. A reduced plate voltage, suitable for the tube used, is obtained through dropping resistors in the transmitter r-f section.

3.4 The power required by this equipment is listed here for various conditions of operation.

	Watts
Key Up, Heaters Off	320
Key Down, Heaters Off	390
Key Up, Heaters On	850
Key Down, Heaters On	920

3.5 Radio Transmitter—The radio transmitter consists of two distinct sections: (1) the r-f transmitter and monitor stages, and (2) the power supply. The monitor assembly is an integral part of the transmitter section. Each of these sections is separately removable from the radio transmitter case. Interconnections between the two sections of the radio transmitter are made by plugs and jacks. Each section contains a plug board at the rear, which fits into a corresponding jack board mounted on the transmitter case. Each terminal on the plug and jack boards and the "external" terminal board ("A") is marked, in order to facilitate its identification.

NOTE—The electrical components in the radio transmitter are divided into three groups for purposes of symbol identification. Those in the r-f transmitter are assigned numbers in the 100 series; those in the power supply are assigned the 200 series; and those in the monitor are assigned the 300 series.

3.6 The schematic diagram for the radio transmitter (Figure 24) is closely associated with the following description. The modulator-oscillator stage generates the r-f modulating frequency, which may be selected from between the frequency limits for this stage of 540 and 830 kilocycles. The modulator-oscillator tube (V101) is a Type –807 beam power tetrode. It is connected in an electron-coupled oscillator circuit. The oscillator tank (the frequency-determining) circuit consists of the capacitors C101 to C116, inclusive, and the variometer L101. The resonance frequency may be varied from 540 to 830 kilocycles by adjustment of the variometer (L101). The variable trimmer capacitor C117 is accessible through the front panel (at the plate marked "B, MOD.-OSC. TRIMMER") to compensate for any change in capacitance caused by replacement of the oscillator tube (V101). This adjustment is normally locked.

3.7 The grid leak resistor (R101) is connected in the ground return lead to the variometer L101. Capacitor C118 blocks the screen voltage and the choke coil L103 provides a d-c path to the oscillator screen grid. The capacitor C130 by-passes to ground any r-f voltage that might appear at the low (r-f) potential end of the choke coil (L103). Capacitor C119 provides a cathode circuit by-pass to ground for r-f current. The plate tank circuit consists of the inductor L104 in shunt with the capacitor C132. Capacitor C132 is adjusted to resonate the tank at approximately 685 kilocycles. The tank resonates broadly enough to provide a relatively constant transfer of signal over the frequency range of the modulator. The capacitor C121 places the "low" side of the plate tank at r-f ground potential. The "high" side of the tank is coupled to the modulator-amplifier stage by capacitor C122.

3.8 Plate voltage is applied to the oscillator through the voltage dropping resistor R102 from the voltage divider-bleeder network (resistors R107 to R115). Screen voltage is supplied directly from the same point on the network. The panel meter (M101) designated "MOD.-OSC. PLATE CURRENT" is connected in series with the cathode of tube V101, and actually measures the sum of the plate and grid currents. The meter (M101) is by-passed by the capacitor C120. Heater voltage for the tube (V101) is supplied from the filament transformer T101. Energy for a low-frequency frequency-meter (not supplied) is coupled capacitively to a load through terminals 9 and 10 of terminal board A.

3.9 The oscillator signal appears across the modulator-amplifier grid coupling resistor (R103), and is reproduced in the plate circuit of the modulator-amplifier tube (V102) with sufficient power to modulate the carrier. The modulator-amplifier tube (V102) is also a Type –807 beam tetrode. The resonance frequency of the modulator-amplifier plate tank circuit (consisting of the capacitor C125 and the variometer L102) is varied by adjustment of the plate variometer (L102). The capacitor C126 keeps the "low" side of the amplifier plate tank circuit at r-f ground potential.

3.10 Plate voltage for the modulator-amplifier tube (V102) is supplied directly from the "high" side of the voltage divider-bleeder network. Screen voltage is supplied through the dropping resistor R105. The screen is by-passed by the capacitor C124. The cathode is by-passed to ground by the capacitor C131. Cathode bias is maintained by the voltage drop across the cathode series resistors R104 and R118. The panel meter M102, designated "MOD.-AMP. PLATE CURRENT" is connected in series with the cathode of the modulator-amplifier tube (V102) and indicates the cathode current of this tube. It is by-passed by the capacitor C123.

3.11 Keying bias for the modulator-oscillator and -amplifier tubes is obtained at the junction of resistors R107 and R108 of the voltage divider-bleeder network. The keying relay (K101) operates to remove this bias by shorting the cathode returns to ground. The resistor R116 prevents the voltage divider-bleeder from being shorted directly to ground at the bias voltage tap. The keying relay may be actuated locally by means of the "TEST KEY" switch (S101). This switch has an open contact, a momentary contact, and a locking position.

3.12 The carrier-oscillator includes two Type –8025 triodes (V103, V104) connected in push-pull, and utilizes the resonant "lines" (L105, L106) in a tuned-grid tuned-cathode oscillator circuit. The effective length of these lines can be adjusted, in order to set the oscillator to the correct frequency. The trimmer capacitor (C127) may be used to alter the capacity between the cathode (filament) lines (L105), and thus provides for tuning over a small frequency range. The modulated plate voltage to the carrier-oscillator tubes (V103, V104) is conducted through the oscillator stage to the plate choke coil (L108) by a shielded lead. The damping resistor (R120) prevents introduction of a resonance peak by the choke (L108). The modulated carrier is coupled from the cathode tank circuit by the loop (L107) and is conducted through a 70 ohm concentric transmission line to the antenna assembly. The position of this loop (L107) can be changed, by means of a screwdriver-slotted shaft, to vary the output coupling. Another loop (L109) picks up energy for the frequency meter. It is connected to the "FREQUENCY METER" receptacle (X105) located on the front panel. Resistor R106 is the grid leak resistor for the stage. Cathode bias is provided by the voltage drop across resistor R117 which is connected from the mid-tap of the filament transformer (T101), through the meter M104 to ground. This meter indicates the plate current of the carrier-oscillator tubes. Meter M105 indicates the grid current for the carrier-oscillator tubes, C129 by-passes the r-f current to ground and C133 is the r-f by-pass for M105.

3.13 Energy is coupled capacitively from the modulator-oscillator plate circuit to the injection grid of the Type –6SA7 monitor-converter tube (V301). The oscillator signal generated in the monitor-converter tube is electron-coupled to the plate circuit of the tube. This latter signal is adjustable to differ by an audio frequency from the modulator signal frequency so that the beat frequency is produced and delivered to the "PHONES" jack (J101). The "PHONES" jack may be switched by means of the "CAL.-MON." switch (S102) to the output of a low-frequency frequency-meter (if the latter is connected to terminals 9, 10, 11, and 12 of terminal board A) when the frequency of the modulator-oscillator stage is being set.

3.14 The monitor oscillator-tank circuit consists of the coil L302, the variable air capacitor C303, and the padding capacitor C302. The coil L303 is the feed-back coil. The resistor R303 and capacitor C305 comprise the oscillator grid leak and capacitor C304 is the by-pass for the low potential side of the oscillator coil L303. C308 and the choke coil L301 constitute an r-f filter circuit.

3.15 Plate and screen supply voltage for the converter tube (V301) is obtained from a tap on the voltage divider resistor (R107 to R115). The voltage is filtered additionally by the inductor L304 and the capacitor C311 and C312. The screen voltage is again dropped through the resistor R305. Resistor R304 provides the plate load. Cathode voltage for the tube (V301) is obtained from the drop across resistor R302. R307 is a bleeder resistor. The effect of signal current variations on the cathode voltage is eliminated by the by-pass capacitor C301. Capacitors C306, C307 and C310 serve to isolate power supply voltages from the monitor output circuits. Resistor R119 is the grid loading resistor for the injection grid of the converter tube V301, Type –6SA7.

3.16 Heater (or filament) voltage is supplied from the secondary of the filament transformer (T101), which is located in the transmitter section.

3.17 The power supply section consists of the transformer, rectifiers and the filter components necessary to provide the high voltage d-c potentials for the transmitter and monitor stages. High voltage is applied to the plates of the 2 Type –836 rectifier tubes (V201, V202) from the secondary of the rectifier plate transformer (T202). Filament voltage is obtained from the filament transformer (T201). Both transformers have tapped primaries to permit compensation for line voltages which differ from the nominal (i.e., 115 volts). Rheostat R201 is included in the plate transformer primary circuit to permit a control of the transformer output voltage. Rheostat R202 is in the primary circuit of the rectifier filament transformer (T201) as well as that of the filament transformer (T101) located in the transmitter section. Thus, this rheostat may be used to maintain the correct filament voltages for the complete equipment. The primary circuit of the plate circuit contains, also, the breaker contacts of the overload relay (K202) and the plate delay relay (K201). A 40 second lag in the application of plate voltage to the rectifier tubes (V201, V202) is provided by the latter (K201), thus assuring that the filaments have reached their operating temperature before the high voltage is applied. The two fuses (F201,, F202) and the "LINE" switch (S201) are included in the primary circuit common to both transformers. This switch (S201) controls the application of power to the complete equipment, with the exception of the thermal elements of the heaters (R203, R401, R501).

3.18 The heaters are supplied from a separate circuit which may be connected to either the 115 volt a-c line or to a 115 volt d-c line. Link connections are provided. The fuses F203 and F204 are included in the heater supply circuit. The heater contained in the power supply section of the radio transmitter is composed of the thermal element R203, the anti-sparking capacitor C204, and the thermal cut-out (S203) which automatically connects power to the thermal element when the temperature falls below 100° F. (37.7° C.) and disconnects power when the temperature rises above 120° F. (48.9° C.).

3.19 The output of the Type –836 rectifier tubes is fed to a choke-input filter consisting of the filter inductor (L201), and the capacitors C201 and C128. This filter is adequate to reduce the hum level to less than one per cent. The voltmeter M201, which is by-passed by the capacitor C203, indicates the output voltage of the power supply. The coil of the overload relay (K202) is inserted in the negative high-voltage supply line. Excessive current through this line actuates the relay, which then opens the primary circuit of the plate transformer (T202).

3.20 FREQUENCY METER—The frequency meter supplied for this equipment is included to enable the operating personnel to set or check the 246 megacycle carrier frequency of the radio transmitter. The frequency meter consists mainly of a microammeter, a crystal detector and a resonant line. Figure 28 is the schematic diagram for this instrument. The resonance frequency of the resonant line may be brought to 246 megacycles by means of a micrometer head "dial" (see Figure 2), which lengthens or shortens the effective portion of the inner conductor. Energy from the carrier-oscillator in the radio transmitter is conducted from the pick-up loop L109 to the frequency meter through a flexible 70 ohm coaxial line. The coupling loop L601 introduces the energy from the line into the frequency meter. A second, pick-up, loop (L602) is connected in series with the crystal detector (Y 602) and the microammeter (M601). When the resonant line is tuned to the transmitter output frequency, energy is coupled from loop L601 to loop L602, and a deflection will be obtained on the microammeter. The microammeter is by-passed by the capacitor C601, which is an integral part of the frequency meter structure.

3.21 A calibration chart giving "dial" settings for frequencies from 245 to 247 megacycles, is fastened to the outside of the frequency meter. A second chart, which has a wider range but which cannot be read as accurately as the first, is supplied in the carrying case. A spare crystal detector cartridge, the 2 foot length of coaxial cable, a can of rust-preventative, and a spanner wrench, are all included with the wooden carrying case, in which the frequency meter should be stowed when not in use.

3.22 ANTENNA ASSEMBLY AND ANTENNA CONTROL UNIT—In order to assure proper operation of this equipment, the rotary motion of the antenna, and its associated mechanical parts in the antenna assembly, must be synchronized with the motion of rotating parts in the antenna control unit. Referring to Figure 26, it may be seen that two switches (S405 and S502), actuated by individual cams and interconnected electrically with each other, automatically set up and continuously maintain correspondence between the position of the antenna and the constant speed motor in the control unit.

3.23 Should, at any time, the switch (S405) in the antenna control unit be operated by the cam motion before the switch cam (S502) in the antenna assembly has reached the corresponding angular position, the motor in the control unit will stop immediately. This motor will remain de-energized until the cam in the antenna assembly operates its switch (S502), at which time power will be restored. Thus, unless both switches are actuated simultaneously, the motor in the antenna control unit will stop.

3.24 Antenna Control Unit—The antenna control unit, illustrated in the outline drawing, Figure 36, and the photographs, Figures 11 to 17 inclusive, serves (1) to automatically energize the keying circuit of the radio transmitter, and (2) to provide a junction board for interconnecting the various units of the Model YG-1 Radio Equipment. The enclosure for the instrument is of weather-proof construction, designed for bulkhead mounting and is provided with an easily opened cover to provide access to the mechanism.

3.25 The wiring and gearing diagram, Figure 32, illustrates in symbolic form the mechanical and electrical connections of the unit. Reference to it should be made frequently while following the description of the mechanism given below.

NOTE: The reset switch (S406) serves as a motor protector for the constant speed synchronous drive motor (B501) in the antenna assembly. Should serious drag develop in the antenna rotation, due to icing or mechanical failure, the contacts of this protective device will trip, thus, opening the antenna drive motor circuit. Before the operation of the antenna assembly can be started again, it will be necessary to reset the switch S406. Resetting the switch is accomplished by depressing the reset button until a sharp click is heard. Should the contacts of switch S406 continue to trip, after once depressing the reset button, a careful inspection of the antenna unit should be made.

3.26 The constant speed synchronous motor (B401) is geared down to rotate the "synchro" (motor control) cam at the rate of two (2) revolutions per minute. This cam, in turn, actuates the switch S405. The manner in which the switching arrangement is operated to maintain synchronism between the motor of the control unit and the motor of antenna assembly has been explained in a preceding paragraph. The drive to the "synchro" (motor control) cam shaft is through a train of gears directly from the motor pinion gear as shown in the gearing diagram, Figure 32.

3.27 The antenna control unit also functions to automatically energize the keying circuit of the radio transmitter in the following manner:

Two double contact keys (S403, S404), similar to high speed telegraph keys, are provided for energizing the keying circuit. One key (S404) operates to transmit bearing signals; the other (S403), to transmit station identification signals. The selection of the type of signals transmitted is controlled by an automatic transfer switch (S402) connected between the two keys. In operation, the (cam follower) lever actuating each key is held against the periphery of the associated cam by spring pressure. The outline of the cam is such that electrical impulses, conforming to International Morse Code characters are obtained. The transmitter keying circuit is energized in such a manner that, as the directive antenna rotates at the rate of 2 revolutions per minute, a bearing signal consisting of two identical letters will be transmitted along the beam during the time required for the center of the beam to rotate through 30° of the bearing circle. A different character will be transmitted in each 30° segment of the circle, the complete set consisting of the twelve letters A-D-F-G-K-L-M-N-R-S-U and W arranged in the order required by the selected code. As shown by the gearing drawing, Figure 32, this bearing signal cam is driven by the constant speed synchronous motor (B401) in synchronism with the rotating antenna. The position of the bearing signal cam with respect to the contact-actuating lever determines the letter being transmitted at that instant. The identification signal cam is also driven by the synchronous motor but at a rate such that a signal consisting of two different Morse characters is transmitted during the time required for the center of the beam to rotate through 45° of the 360° circle of transmission. This signal will consist of any two of the letters B-C-J-O-P-Q-X-Y and Z, selected as required by the prescribed code. Since both cams are rotating at all times, the selection of the contact that completes the keying circuit is performed by a switch (S402) actuated by the selector cam shown in Figure 32. The gearing is such that the bearing signals are transmitted for periods of four and one-half minutes, and the station identification signals are transmitted for a period of one-half minute between the periods of the bearing signals. Out of every ten revolutions, in terms of rotation of the antenna, the station identification signals will be transmitted for one revolution and the bearing signals for nine revolutions.

3.28 The bearing signal cam is driven through a mechanical differential, one side of which is rotated at a constant speed by means of the constant speed motor (B401) and the other side of which is connected to a dial and handcrank, designated as "SHIP COURSE." The latter side of the mechanical differential is set (in accordance with the ship's course) through a helical worm and gear drive, which is of a self-locking type in order to prevent the mechanism from movement in either direction. When the crank handle is operated, the output of the differential is positioned by the combined movement of the constant speed drive and of the "SHIP COURSE" dial and thus retards or advances the position of the bearing signal cam relative to the position of the antenna. Thus, a given code signal transmission may be maintained in a given geographic direction.

3.29 A red signal light identified as "BOW SIGNAL" is located on the face of the antenna control unit to serve as a direction check on the transmission. The electrical connections to this light are made by the switch S501 which is actuated by the antenna assembly motor control cam during 30 degrees of its rotation. This provides a means for monitoring the orientation of the bearing signals. This circuit may be adjusted so that the light operates within 15 degrees of North (for a land station installation) or of the ship's bow (for ship board operation).

3.30 **Antenna Assembly**—The antenna assembly consists of a directional antenna array, composed of twin di-poles centered in an assembly of reflector rods; and a pedestal-housing, which serves as a mounting base and also contains the rotating and mechanical coupling mechanism for the antenna array. During normal operation the antenna array rotates at 2 r.p.m. The assemblv is illustrated in the photographs, Figures 18 to 20, inclusive.

3.31 The array consists of a pair of di-pole radiating rods, separated from each other by approximately ½ wavelength, and spaced a short distance in front of a series of 15 reflector rods. The arrangement is such that approximately a 45 degree beam of r-f energy is radiated, relative to any one position of the array. The array elements are assembled on a skeleton metal frame, slightly less than 4 feet square. The frame is held vertically erect by a support tube located at the center of a rear, horizontal member. The support tube fits into the rotating mechanism, housed in the antenna assembly pedestal.

The frame is constructed of hollow square members, arc-welded, and painted inside and out to prevent rusting. The reflector rods are welded in position. The di-pole radiators are filled with steel "sand blast" shot, in order to absorb and dampen any vibration. The pedestal is constructed of an aluminum alloy and is painted for further protection.

3.32 The pedestal contains the synchronous motor (B501), which includes one set of "step down" gears; and the gear box, which includes a worm and pinion set of gears. The motor control cam and the synchronizing switch (S502) are also included. The complete step down ratio between the motor and the array support tube (which fits, by means of a spline, into the gear box pinion gear) is such as to effect an antenna rotation of 2 r.p.m. Rotating parts within the pedestal are supported through ball-bearings. The worm and pinion gears operate in a bath of heavy oil, and provision is made, by the inclusion of grease fittings, to supply lubricant to the bearings. Easily replaceable ring seal gaskets and packings are utilized throughout the rotating mechanism. A hinged door, normally held in place by eyebolts, permits access to the interior of the pedestal.

3.33 The transmission line is run from the base of the pedestal through the support tube, to the antenna array. A rotating coupling permits the upper section of transmission line to rotate with respect to the lower section as the antenna array revolves. Wiping contacts insures a good electrical connection for both the inner and outer conductors of the line.

3.34 The transmission line coupling transformer is included at the end of the line, near the bottom of the antenna array.

IV

INSTALLATION

4.1 It is recommended that the installation personnel become familiar with this entire section before attempting to install the equipment. A knowledge of the design and operation of this equipment as covered in other sections of this book is also desirable. This may aid materially in reducing the time required for installation and assure proper subsequent operation.

4.2 In unpacking and handling the various units, care should be exercised to prevent damage to the equipment. The following precautions should be observed.

(a) Keep all boxes and crates upright at all times.

(b) Have adequate transporting and lifting gear, as well as sufficient personnel, available to prevent any of the equipment from being subjected to unwarranted shock.

(c) Uncrate the various units and unwrap them carefully to avoid unnecessary damage to the finishes.

(d) In opening boxes or crates, remove at least three sides, extracting all nails with a nail puller; do not use a hammer or a pinch bar for this purpose.

4.3 After uncrating the transmitter unit, remove the rear and side shields and inspect the interior for possible damage in shipment. Any parts or wiring which may have been displaced during shipment should be replaced in their proper locations. The test data secured inside of front cover of the radio transmitter unit box, after acceptance by the local inspector, should be removed and placed in the copy of the instruction book during installation.

4.4 LOCATION OF UNITS—The location selected for the radio transmitter and antenna control units should afford adequate lighting, ventilation and accessibility for operating and servicing. It is also important to position the units for greatest convenience in inter-unit wiring.

4.5 Radio Transmitter—This unit is designed for table or bench mounting. Terminal tubes are provided to accommodate the interconnecting cables. Remove the power supply (lower section) from the case. This is accomplished by loosening the four holding screws and pulling the unit forward by means of the handles. When the section is drawn forward, it will engage the stopping blocks in the track. If, at this point, the front of the power supply is raised, the unit may be completely withdrawn from the cabinet. The transmitter section can then be removed in a similar manner except that, before this section is withdrawn, it will be necessary to reach in the case, under the transmitter section, and push in the forward pins of the metal blocks fastened near the runners, after which it may be drawn forward and clear of case. When the two sections are out of the cabinet, the terminal board "A" may be seen. This board contains 16 terminals.

4.6 Refer to the radio transmitter outline drawing, Figure 35. Drill mounting holes in the table or bench to conform with the mounting hole dimensions shown on this drawing. Place the case on the table and make it fast. There are four cables which enter this unit. Install the proper cables to the Terminal Board "A." The wires should be fed into the corners of the frame members, half of the wires on each side; and then over the member that carries Terminal Board "A." Connect the wires to the terminals provided. If no 115 volt d-c supply is available, omit the d-c supply cable. Replace the r-f unit and then the power supply in the case, making certain that both of these units are forced all the way to rear and that the panel holding screws are then drawn up tightly.

4.7 Antenna Control Unit—The antenna control unit is designed for mounting on a bulkhead or other vertical support by means of three ½ inch bolts or cap screws. Horizontal mounting is permissible, if such is desired. The size and point of entrance for the interconnecting cables, as well as other pertinent installation information, is given in the antenna control unit outline drawing, Figure 36. The outer covering should be stripped from the cables from the point where they enter the control unit, and the individual leads run to the terminal board "G." Lugs are supplied at each terminal position, to which the leads should be soldered.

NOTE—Do not use acid flux to solder the cable leads. Remove excess flux from each completed connection.

4.8 Antenna Assembly—Refer to the antenna outline, Figure 37, for mounting data, and to Figures 25 and 39 for electrical connections. This assembly should be installed as high above the deck as is consistent with the design of the superstructure of the ship. As far as is practicable there should be no obstructions in the vicinity of the antenna; any such obstruction would alter the directivity of the radiator thereby decreasing its usefulness. The mounting pedestal should be so positioned that the AZ line, which is engraved on the top surface of the pedestal is parallel to the keel line of the ship. The antenna array should be positioned in such a manner that the plane of the reflector is at a right angle to the AZ line. This may be accomplished by energizing and de-energizing the antenna drive motor through the line voltage switch on the transmitter panel until the antenna is in the desired position. Next, open the access door on the mounting pedestal and adjust the position of the cam, by loosening the three bolts used to secure the cam, then rotate the cam in such a manner that the highest level makes contact with the cam follower. This adjustment insures proper operation of the red signal lamp (described in Paragraph 3.29 as the bow signal) on the antenna control unit. Tighten the three bolts. to hold the cam securely.

NOTE—The four leads from terminal board "H" terminals number 1 and 2, to motor, should be dressed up and retained by cable clamp provided for incoming cable. This will prevent motor leads from coming in contact with or resting upon motor case. Such procedure will eliminate possibility of scorched wires caused by contact with hot motor case.

4.9 The motor synchronizing switch (S502) in the antenna assembly should have the following contact clearances for proper operation (refer to Figure 27):

(1) When the cam follower is on the normal circumference of the motor control cam, the normally open contact should be approximately 0.060 inch clear of the center contact. The "across the bow" (pilot lamp) contacts should be approximately 0.030 inch apart.

(2) When the cam follower is on the first level of lift on the double dam, the normally open contact should be approximately 0.030 inch clear of the center contact. The "across the bow" contacts should be closed with a 0.030 inch displacement of the one contact.

(3) When the cam follower is about half-way to the second level of lift on the double cam, the normally open contacts are closed and deflected approximately 0.015 inch. The "across the bow" contacts should be closed.

(4) When the cam follower is at the top of the second level of lift, the normally open contacts should be closed and deflected approximately 0.060 inch. The "across the bow" contacts should be closed, with approximately one-quarter inch deflection of one contact.

4.10 If any of these conditions are not met, remove the terminal nut, and adjust the contact in its "open" position for the required clearance by rotating the clearance adjusting nut in the proper direction. Loosen the clamp screw on the contact support post before adjusting the contact.

4.11 Before applying power to the assembly, lubricate the grease fittings with Navy Type 14L3 grease and check to be certain that 1 pound of Esso W. S. 334 oil is in the gear box. Access to the interior of the pedestal-housing may be had by loosening and throwing back the 4 eye-bolts, and then opening the door-panel thereby unlocked. The motor contains a sufficient amount of lubricating oil, when shipped, and it requires no further lubrication at the time of installation.

NOTE—The oil in the gear box should be replaced one month after the installation of the equipment. After that time, additions and replacements should be made in accordance with the instructions given in the "Maintenance" section of this book. Easily recognizable squarehead **fill** and **drain** plugs are located on the top and front sides of the gear box.

4.12 Antenna Control Unit—The antenna control unit requires certain checks and adjustments after it is installed and before it is placed in operation. Before checking the unit, refer to photographs, Figures 11 to 17 inclusive, and observe the following procedure:

(1) Align white line on the handcrank assembly with white line on the case flange and lock the handle in this position. This aligns the course setting coupling inside the case so that the chassis can be lifted out.

(2) By means of the handle, unclamp and raise the lid. Unscrew the 5 mounting screws and lift the complete chassis from its housing, care being taken not to damage the cable in removing chassis. Screw the 3 hexagonal posts (located in the signal disc container) into 3 of the tapped holes just vacated and remount the chassis on top of these posts by means of the original mounting screws. (Refer to Figure 14.)

(3) Loosen the motor drive gear clamp (identified as A4 in Figure 32).

4.13 To adjust the relative alignment of the bearing signal and station identification, a typical case is to be described: It is assumed that the synchronizing cam in the antenna assembly was adjusted as described in Paragraph 4.8; it is also assumed that the ship is stationary with the bow pointing due east. The compass indication should be 90°. Install the bearing signal cams on the bearing signal disc in the desired order. Install the station identification letters on the station identification signal disc. Rotate the bearing signal cam to the position at which the cam follower is coincident with the junction of the 330° and 0° segments (345° true bearing). Loosen the clamp A3 (identified on Figure 32); rotate the station identification signal disc counterclockwise, until the cam follower lies in the center of the blank insert just ahead of the group of two letter station identification letters, then tighten clamp A3.

4.14 To adjust the signal selector (transfer) switch (S402), set the bearing signal disc in such position that the cam follower is coincident with the junction at the 330° and 0° (345° true bearing) segments as described in Paragraph 4.13. Loosen clamp (A2) which may be identified on Figure 32, and rotate the bearing signal cam 180° counterclockwise to such position that the cam follower is coincident with the junction of the 150° and 180° segments (165° true bearing). Then, rotate the signal selector cam until the cam follower drops into the detent in the cam.

4.15 Rock the cam back and forth through a small arc, to facilitate positioning the follower at the bottom of the "V." Tighten the clamp A2 when the follower is exactly in this position, and make sure, after tightening the clamp, that the position has not changed. Rotate the bearing signal cam clockwise 180 degrees to the 345 degree position.

Tighten the motor drive gear clamp (identified as A4 in Figure 32).

In order to move the bearing signal disc as required in the following procedure, turn the shaft which normally would connect to the "SHIP COURSE HAND SET CRANK"; the ship course dial will now show the number of degrees through which the bearing signal disc is rotated.

4.16 Adjust the locking and contact screws of the signal selector switch so that a two degree movement of the bearing signal disc toward 330° causes the right hand contact of S402 to close, and a two degree movement toward the zero degree position causes the left hand contact of S402 to close. The bearing signal disc is then rotated counter-clockwise until the selector switch arm (S402) is in "mid-position" (between the right and left hand contacts), then note how many degrees is lacking to complete the 360° turn (should be approximately 15°). Now rotate the bearing signal disc clockwise to 165°, then rotate the bearing signal disc counterclockwise ½ of the degrees noted above (approximately 15/2). Loosen the clamp (A2) holding the signal selector cam and readjust the cam follower as in Paragraph 4.15 except using new location of the bearing signal disc. THIS IS NECESSARY AS IT IS A FINAL ADJUSTMENT. Then readjust the contact of S402 as described in the first part of this paragraph. The bearing signal disc is then rotated counterclockwise one complete turn to the 345° position. The left hand contact of S402 should remain closed during this turn until about two degrees before the 345° position is reached, at which time this contact should open, leaving both open until the disc is turned two degrees more counterclockwise. At this time the right contact closes and remains closed for nine revolutions of the bearing signal disc.

4.17 After completing above adjustments, the system should be stopped at the position where the cam follower is coincident with the index line at the center of the segment which is located at the 0° position on the bearing signal disc. Loosen clamp A1 and position the synchro cam so that the cam follower falls into the recess. Tighten clamp A1. Loosen the thumb screw, securing the ship course dial, and position the dial at 0°. Tighten the thumb screw. Rotate the dial by means of the "SHIP COURSE HAND SET" crank, until the compass indication is 90°. The purpose of this adjustment is to compensate for the position of the ship, i.e., with the keel line pointing due east; should the ship be oriented southeast, for example, the "SHIP COURSE HAND SET" crank should be rotated until the ship course dial indication is 135°. To maintain the correct bearing signal transmission, the ship course dial always must be so positioned that the indication on the dial coincides with the compass indication, when the ship is afloat.

4.18 The antenna control unit may be mounted in position before the following adjustments are made.

4.19 Check the gap between the contacts of each of the keying switches (S403, S404). When the cam followers are on the mean circumference of their respective cams (i.e. when they are on a portion of the cam circumference which does not result in a "closed" keying switch contact), the center contact surface should be a distance of 0.020 inches from each outer contact surface. If such is not the case, rotate the "stationary" contact by means of a screwdriver until this spacing is attained (after loosening the clamp screw on the contact support post).

4.20 Check for good electrical contact of the keying switches (S403, S404) by connecting a self-powered buzzer across terminals 1 and 3 of terminal board G. When the follower rides on the inner or outer circumference of the cams, one set of contacts of the switch under consideration should "make," and the buzzer should operate. Should any set of contacts not "make" under these conditions rotate the "stationary" contact clockwise just enough to establish contact for that side of the switch (after loosening the clamp screw on the contact support post).

4.21 Adjustment of Motor Synchronizing Switch —The motor synchronizing switch (S405) should have the following contact clearances for proper operation (refer to Figure 27):

(1) When the cam follower is on the normal circumference of the motor control ("synchro") cam, the switch contacts should be closed and displaced approximately 0.030 inch toward the support.

(2) When the cam follower is at the deepest part of the recess of the motor control cam, the contacts should be open with approximately 0.030 inch clearance between them. If these conditions are not met, remove the terminal nut, and adjust the contact in its "open" position for the required clearance by rotating the clearance adjusting nut in the proper direction.

After the equipment has run for approximately 48 hours, the above adjustments should be checked; particular attention paid to the readability of the signal and the proper transfer between the two signal switches (S403, S404).

4.22 When the adjustments have been completed, make sure that the proper station identification and bearing signal sectors are in place on their respective cams, and that the cams are properly installed on the antenna control unit. A set of station identification sectors, and 4 completely assembled bearing signal cams are included in the signal disc container.

4.23 Each station identification and bearing signal sector is tongued to fit a groove in its respective cam disc. The 4 station identification sectors are located against permanent stops, and are secured in position by a wing nut. A lock wing bolt holds assembly to respective shafts. Each bearing signal sector is held in position by a fillister head machine screw. The two cam assemblies are shown in Figure 12. To remove the signal discs, unscrew the associated wing nuts and bolt and lift them from the shafts. The mountings are keyed, in order to prevent any alteration in the relative settings.

4.24 Transmission Line—One hundred and forty feet of ⅞ inch (outside diameter) concentric transmission line is supplied with this equipment. This transmission line serves to conduct the output of the radio transmitter to the antenna assembly.

4.25 This line is shipped in sections 20 feet long. Each section consists of an outer conductor of hard-drawn copper tubing with a wall thickness of 0.045 inch and an inner conductor made of copper tubing of ¼ inch outside diameter, centered by means of insulators spaced three inches apart. These line sections may be joined by means of permanent or detachable type coupling to form a gas-tight, electrically bonded assembly.

4.26 Instructions are given here for the satisfactory installation of the transmission line. In planning the installation, consideration should be given to making the line as short as possible and with a minimum of bends. Since the line is made of hard drawn copper, it will be necessary to anneal sections of the line to permit the bending found necessary in the course of installation. The procedure for annealing the line will be given later.

4.27 Splicing Line Sections—In straight runs, sections of the line as furnished are spliced by means of the detachable couplings, which are also supplied. Where a bend is required, the line should be cut and the bent section inserted and spliced by means of these couplings. It is important that the insulator spacing at the joints, as well as within the sections, shall not exceed 3 inches.

4.28 The detachable coupling device consists of an outer sleeve coupling which serves to join the two outer conductors, and an inner coupling pin which bonds together the two conductors. This device is illustrated in Figure 39. The outer coupling requires no soldering since the two packing glands of the coupling provide a gas-tight joint and an efficient electrical bond. The inner coupling pin of the coupling device is available in two types as follows:

(a) The non-detachable type consists of a single pin, one half of which is fitted into each of the inner conductors to be coupled. The latter may then be butted against the center shoulder of the pin and soldered to the pin as described in Paragraph 4.29.

(b) The detachable type consists of two pin sections joined by means of a threaded coupling. One pin section should be inserted into each of the respective inner conductors and soldered. The inner conductors may then be connected by tightening the threaded couplings using a pair of ¼ inch open-end wrenches. Care must be exercised not to apply undue torsional strains while connecting or disconnecting the inner conductors.

4.29 Prior to joining sections of the line, the inside of the inner line and the outside of the outer line should be brightened with sandpaper for a short distance from the end. Remove the rubber packing gasket from the coupling and clean and brighten the contact spring which is imbedded in the rubber in order to insure good electrical contact. Slip a locking nut and a packing gasket onto the end of each section of transmission line and slide them along about six inches away from each end. The contact spring should face towards the end of the line being joined. Also slip the outer conductor coupling sleeve to one end of the line prior to soldering the inner connector.

4.30 To join the inner conductors, lay the two lines end to end, and slide the inner conductor of one so as to expose a short length. The inner conductor coupling pin should be tinned and inserted up to the shoulder into the end of the exposed inner conductor. A small amount of soldering flux applied to the pin after it is tinned will insure a good soldered joint when it is later sweated to the inner conductor. DO NOT USE ACID FLUX. This inner conductor is then slid further, until the protruding half of the coupling pin is inserted fully into the inner conductor of the other section. If this is done properly, the ends of the two inner conductors will be butted against the center shoulder of the coupling pin, with the coupling pin centered between them. The inner conductors then may be sweated (soldered) to the coupling pin by heating the joint with a gas flame. (A Prestolite flame may be used.) Care must be exercised in handling the line to prevent it from being dented and thereby impeding the easy sliding of the inner conductor.

4.31 Extreme care should be exercised to prevent the insulators from becoming soiled during the soldering of the inner conductors. They may be cleaned by washing with a solvent such as carbon tetrachloride.

4.32 After the inner conductors have been joined, slide the outer conductors together, until the two ends butt against each other. Center the outer coupling sleeve over the joint. Slide the two rubber packing gaskets along the line toward the coupling and set them in position, making sure that the contact springs are wedged firmly in contact with the outer coupling sleeve and the outer conductor. Refer to Figure 39. This insures the electrical continuity of the outer sheath, since the contact spring serves as a metallic contact between the coupling unit and the outer conductor of the transmission line. The spring becomes embedded between its housing and the transmission line outer conductor as the gland compression nut is tightened. The coupling should be tightened with reasonable force by applying about 10 to 15 foot-pounds torque to the compression nuts.

4.33 After completing each splice in the line, a resistance check from the inner to outer conductor should be made with a "megger" (megohmmeter). A faulty joint would be indicated by an appreciable decrease in leakage resistance over that of normal operating installations using comparable lengths of line. This enables a defective joint in the line to be located directly before the line is completed. The outer conductor on the end of a line opposite to that at which a splice is made may have to be cut back to expose sufficient inner conductor for a splice at that end.

4.34 A splice in the line may be disassembled for inspection or repair by loosening the coupling nuts and sliding back the rubber packing gasket and the sleeve coupling housing, thereby exposing the joint. As the packing gaskets do not fatigue or set, they may be used over again when reassembling the coupling.

4.35 Use of Anchor Joints—Anchor joints are recommended for use only near the ends of long vertical runs and adjacent to short-radius bends which terminate long straight runs. This joint is not required adjacent to pre-fabricated elbows. The anchor joint consists of one inner conductor coupling pin, one ceramic insulator, two ½-inch lengths of slotted cylindrical sheath and an outer, sleeve coupling. Refer to Figure 39. In making up a joint where an anchor joint is required, insert the long end of the inner conductor coupling pin into the ceramic insulator. Slip the solderless outer conductor sleeve coupling over the line. Then slide the inner conductor out of the line, far enough to make the inner conductor splice. This can be done as described in Paragraph 4.29. Then fit one of the ½ inch cylindrical sheaths into the outer conductor coupling between the ceramic insulator and the end of the outer conductor. Then place other ½ inch sheath in the coupling sleeve on other side of insulator. Slide the remaining section of outer conductor so that the sheath is firmly secured between the outer conductor and the ceramic insulator. Position the outer coupling sleeve centrally over the joint, and fasten it securely in place.

4.36 Bending Line Sections—It is possible to bend this transmission line, as may be required by the installation, to any curvature of a radius greater than 3 inches. Before doing so, the outer sheath must be satisfactorily annealed so that it will not be deformed during the bend operation.

4.37 Annealing—The annealing process consists of heating the section of the tube to be bent (using a gas torch equipment, such as Prestolite) and then allowing it to cool gradually. Care should be used during this process to avoid denting the tube. Proceed as follows:

(a) Determine the radius of the bend required. The length of outer tubing to be removed and softened should be equal to the length of the section to be bent plus at least an additional four inches. For a 90-degree bend, the length of the section to be bent will be equal to $\frac{\pi R}{2}$ inches (where R is the radius in inches.) The extra 4 inches is necessary in order to allow 2 inches of straight line at each end of the bend for connection to the solderless coupling. A greater length of straight line is permissible, and may be desired in order to facilitate handling.

(b) Remove a section of transmission line equal in length to that determined above. This should be cut off with a very fine-toothed hacksaw handled carefully so as not to bend or distort the shape of the outer conductor. Do not apply any pressure other than the weight of the saw.

(c) Remove the inner conductor from the section of line to be bent.

(d) Place the section of outer conductor on two metal blocks separated a distance equal to the curve length $\frac{\pi R}{2}$ determined in (a). The section should be centered on these blocks.

(e) Apply the flame to the portion of tubing between the blocks. The heat should be applied uniformly to this center section until the tubing has attained a dark blue color. Do not heat the portion of line resting on the metal blocks as these ends are not to be softened. Softening them may result in their collapse when the coupling seals are clamped.

(f) Allow the tube to cool gradually.

(g) After cooling, the tube should be clamped.

Remove any copper oxide that may have formed inside of the tube by tapping smartly, but lightly, with a small hammer.

4.38 Bending—The line may now be bent. For bends having a radius of 8 inches or more, the inner conductor is replaced in the tube and the annealed section is bent to the required radius around a hard wooden form of the same radius. Bending should occur only in the annealed section. When completed, the section should be cut to the exact length required, leaving 2 or more inches of straight hard line at each end. The inner conductor should be centered, and its end cut so that it projects about one-half inch beyond each end of the tube.

4.39 Where a radius of less than 8 inches is required, it is necessary to fill the section of tubing to be bent with a Woods metal filler before bending so that it will not collapse when bent sharply. The inner conductor is not bent simultaneously with the outer conductor, but instead is bent separately around a form of the correct radius and then slipped into the outer conductor after being bent. It is inadvisable, in this case, to leave over 2 inches of straight section for coupling. Bend the outer conductor as follows:

(a) Place the Woods metal alloy in a clean ladle and cover it with water.

(b) Heat the water to the boiling point, at which temperature the Woods metal will be in a molten state.

(c) Pour the boiling water off the top of the ladle into the tubing, one end of which has been closed tightly with a cork or other stopper. The hot water preheats the tubing and guards against cold sets when the filler solidifies.

(d) Pour the molten Woods metal into the tubing, displacing the water.

(e) While the tube is filled with molten alloy, plunge it quickly (corked end first) into a tank of cold water. Chilling should be progressive from the corked end towards the open end to prevent cavities in the metal. This should be repeated several times.

(f) After chilling, allow the tubing and its filler to attain room temperature before bending.

(g) Bend the tubing around a form of the required radius by slowly applying a uniform force. Application of force quickly or unevenly may cause a failure in the tubing.

(h) When the tubing has been bent, remove the Woods metal by heating the tubing in a steam bath or in boiling water. The metal may be drained from the tubing in a molten condition and used again.

(i) The ends of the bent outer conductors should finally be cut to the correct length, that is, 2 inches on each end beyond the curved portion. The inner conductor should be carefully bent so that it will have the same shape as the outer one. It should be cut so that its total length is 1 inch longer than the total length of the bent section. Slip the inner conductor into the outer tube, deforming it as little as possible. Reform the bend, if necessary, after insertion and center it so that one-half inch of the inner conductor is exposed at each end.

4.40 Splicing—In splicing a bent section to the transmission line, the solderless conductors should be used in the same manner as described for splicing straight sections of the line. The only difference is that the ends of the outer tubing will be separated by one-half inch to allow for completing the soldered connection of the inner conductor. It is then necessary to center the outer coupling sleeve carefully over this gap before the packing gaskets are installed in position, and the coupling is tightened.

4.41 Running the Line—Care should be taken that the inner conductor is properly centered within the outer tubing throughout the entire span of the transmission line. Rough handling of the inner conductor or of the bent sections should be avoided.

4.42 Each line section is equipped with a metal cap at each end. These caps should not be removed until it becomes necessary to make the required joints. Upon completing the installation, the open ends of the line should be covered in a suitable manner to exclude moisture, salt spray, or other harmful matter.

4.43 The outer conductor of the line should be bonded frequently to the structure along which the line is run. Where the line is exposed to possible mechanical injury in service, it should be protected by a suitable metal guard.

4.44 After the line is made up, nitrogen gas should be injected into the line by means of the entrance valve located near the transmitter end of the line. When gas is introduced into the transmission line, the plug located on the base of the antenna coupling transformer (at the antenna array) should be removed, in order to allow the displaced air to escape. When all of the air has been expelled, replace this plug in the coupling transformer and allow a pressure of from 5 to 10 pounds (above atmospheric pressure) to accumulate. The gas-feed apparatus should be equipped with a pressure gauge. One method of finding out when all the air has been expelled from the line is to hold a lighted match or candle flame at the coupling transformer air outlet. When the flame goes out, it may be assumed that nitrogen gas is flowing from the outlet.

4.45 WARNING—OPERATION OF THIS EQUIPMENT INVOLVES THE USE OF HIGH-VOLTAGES WHICH ARE DANGEROUS TO LIFE. OPERATING PERSONNEL MUST AT ALL TIMES OBSERVE ALL SAFETY REGULATIONS. SEE THE SECTION HEADED "SAFETY" WHICH IS LOCATED IN THE FRONT PART OF THIS BOOK. DO NOT CHANGE TUBES OR MAKE ANY INTERNAL ADJUSTMENTS WITH THE "LINE" SWITCH TURNED ON. THE DOORS IN THIS EQUIPMENT ARE NOT INTERLOCKED. BEFORE CHANGING TUBES OR MAKING ANY INTERNAL ADJUSTMENTS, OPEN THE MAIN LINE SWITCH IN THE SUPPLY LINE TO THE EQUIPMENT.

4.46 Preliminary Adjustments—Install the 2 Type —836 rectifier tubes in their sockets in the power supply. Access to these sockets may be had by opening the door in the power supply front panel. Place the plate caps on tube. The tube sockets for the two Type —807 tubes of the modulator may be reached when the left hand door of the transmitter section is opened. The Type —8025 tubes may be placed in their sockets after the right hand door on the transmitter section panel is opened. Slip the plate connectors on both plate caps of each tube. In order to place the Type —6SA7 tube in its socket in the monitor chassis, it is necessary to remove the shield on the right side of the transmitter. Replace the shield. All of the above mentioned tubes should be handled very carefully, especially the Type —8025.

4.47 At the installations where 115 volts d-c is available and can be used for the heaters in the three major units of this equipment, the connections on the link board of the power supply should be connected to permit its use. This board is plainly marked.

These heaters are used to de-humidify the equipment during periods of extremely high humidity. The equipment, as shipped, has the links connected for a-c operation of the heaters.

4.48 To readjust the signal selector (transfer) switch, first loosen the motor drive gear clamp (identified as A4 in Figure 32). Then adjust as described in paragraphs 4.14, 4.15, and 4.16.

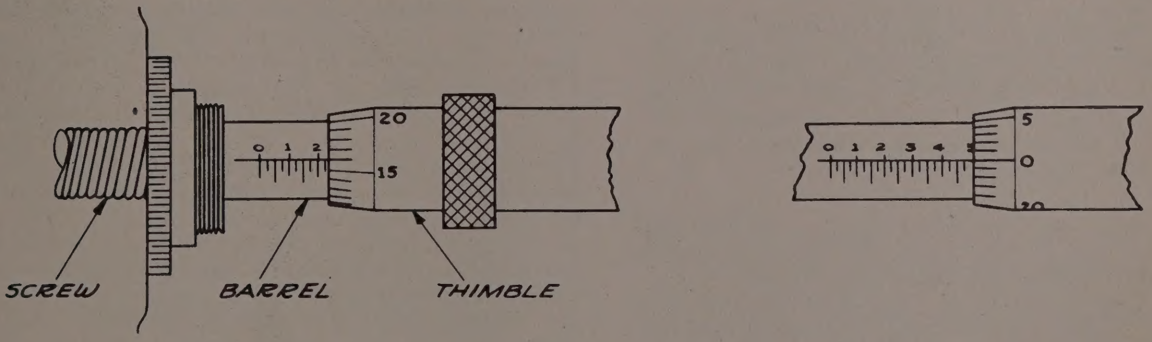
4.49 Radio Transmitter—Operate the "LINE" switch (S201) to the "OFF" position and open the door on the power supply panel. Set the heater switch (S202) in the "ON" position. Close the door and operate the "LINE" switch (S201) to the "ON" position. In approximately 40 seconds, the time delay relay (K201) should close, permitting the application of plate voltage when "PLATE" switch (S204) is closed. Adjust the "FILAMENT VOLTAGE" rheostat (R202) so that the "FILAMENT VOLTAGE" meter (M103) indicates 6.3 volts. The antenna assembly should be rotating and the mechanism in the antenna control unit should be in motion. Allow the equipment to remain in this state of operation for approximately 45 minutes so that the heaters can dry out any moisture which may have collected in the equipment during transit.

4.50 Control Designations—The controls on the transmitter panel are designated as follows:

Control Designation	Symbol of Controlled Component
"A. MOD.-OSC. TUNING"	L101
"B. MOD.-OSC. TRIMMER"	C117
"C. MOD.-AMP. TUNING"	L102
"D. H.F. OSC. TRIMMER"	C127
"E. MONITOR TUNING"	C303
"F. OUTPUT COUPLING"	L107

4.51 When the equipment is shipped from the manufacturer's plant the high-frequency oscillator is tuned and properly loaded for operation on 246 mc. However, during shipment, these adjustments may have been disturbed so it is advisable to check the frequency by means of the frequency meter supplied with this equipment.

4.52 The frequency meter is equipped with a micrometer type tuning "dial." The pitch of the screw is 1/40 inch (40 threads to the inch). Thus, the distance traversed by the screw during one complete revolution is 1/40 (or 0.025 inch). As the graduations on the barrel conform to the pitch of the screw (40 to the inch), each division equals 0.025 inch and every four divisions indicate 1/10 inch. Each tenth of an inch is numbered 0, 1, 2, etc. (0 inch, 0.100 inch, 0.200 inch, etc.). The beveled edge of the thimble is divided into 25 parts, with every fifth division marked 0, 5, 10, 15 and 20. When 25 of these divisions have passed the horizontal line on the barrel, the spindle, having made one revolution, has moved 0.025 inch. Thus, when the spindle moves only far enough to cause one division to pass the horizontal line on the barrel, it will have moved 1/25 of 0.025 inch or 0.001 inch. The distance between the divisions on the thimble is great enough to permit half and quarter thousandths of an inch to be readily estimated.



SETTING IS 241 (EXAMPLE ONLY)

SETTING IS 500 (246 MEGACYCLES)

Figure 2—Frequency Meter (Micrometer Dial, K-875751)

4.53 To Read the Dial Indication—First note the last figure visible on the scale on the barrel (representing the tenths). Multiply the number of graduations visible beyond this figure by 25 and add the number of the division on the scale on the thimble that coincides with the horizontal line on the barrel. Then this sum (expressed in thousandths), added to the tenths shown, is the indication.

4.54 Example—In Figure 2, 0.200 (2/10) is shown by the figures on the scale on the barrel and one graduation beyond a tenth calibration is also visible, while on the bevel of the thimble, 16 divisions shown from the "0" to the line coincident with the horizontal line on barrel. Then the reading will be 0.200 +0.025 +0.016=0.241.

4.55 Normally, the h-f oscillator may be set at 246 megacycles by adjustment of the screwdriver control "D." However, if any of the various other adjustments of this oscillator are incorrectly set, the stage should be completely realigned as follows.

4.56 Disconnect the lead to terminal number 1 of terminal board "A." Tape the end of this lead in order to prevent a short-circuit to ground. The removal of this lead will prevent operation of the antenna assembly and the antenna control unit, and thus also will prevent keying of the modulator stages in the radio transmitter.

4.57 Remove the shield from the right side of the radio transmitter case, and then remove the side shield of the r-f section (refer to Figure 4).

4.58 Loosen the Bristo head cap screws which lock the coupling coil (L107) assembly just enough to permit the assembly to be slid back and forth. These screws are accessible from below the oscillator compartment (refer to Figure 6). The wrench for these screws is supplied, and is mounted on the right side of the front corner member of the transmitter frame. After loosening the screws, replace the r-f unit side shield.

4.59 Close the "LINE" switch (S201) and adjust the filament voltage by means of the "FILAMENT VOLTAGE" rheostat (R202) until the "FILAMENT VOLTAGE" meter (M103) indicates 6.3 volts. Adjust the control "A" to the proper setting for the desired modulation frequency. Typical settings are indicated on the tuning curve, Figure 42.

4.60 Close the "PLATE" switch (S204) and adjust the "PLATE VOLTAGE" rheostat (R201) until the "MAIN PLATE VOLTAGE" meter (M201) indicates 640 volts when the "TEST KEY" is in the center position. Raise the "TEST KEY" to the "LOCK" position, and adjust control "C" for a minimum reading (dip) on the "MOD.-AMP. PLATE CURRENT" meter (M102). Return the "TEST KEY" to the center position and observe the indication on the "H.F. OSC. PLATE CURRENT" meter (M104). This meter should indicate between 100 and 105 milliamperes. These are normal (and safe) operating values for the plate current of the h-f oscillator tubes. The grid current indicated by meter M105 should be between 30 and 40 ma.

4.61 If M105 milliammeter indicates more than 40 ma. it will be necessary to reduce feedback in the h-f oscillator. To do this, shorten the effective length of the filament lines by moving the shorting bar across these lines towards the h-f oscillator tubes (V103, V104). The shorting bars may be unclamped and reclamped by means of the thumb-nut. The feedback should be increased if the grid current is less than 30 ma. by increasing the effective length of the filament lines.

4.62 Varying the feedback by this method will result in a shift in the h-f oscillator frequency. To compensate for this, the length of the grid lines may be varied. To increase the oscillator frequency, move the shorting bar along the grid lines near to the h-f oscillator tubes. The frequency should be checked after such adjustments by means of the h-f frequency meter.

4.63 Again depress the "TEST KEY" to "MOMENTARY," and note the change in the grid current indicated on M105. If the oscillator is properly adjusted, the grid current indication on M105 should not vary by more than one ma. between the **center** and "MOMENTARY" positions of the "TEST KEY."

4.64 If the grid current **decreases** more than one ma. when the "TEST KEY" is depressed, the oscillator is overcoupled to the output; if the current **increases** more than one ma. the oscillator is undercoupled. Should either condition exist, adjust the control "F" by means of a screwdriver until the current change is less than one ma.

4.65 Adjustment of control "F" moves the coupling loop (L107) in a horizontal plane. If sufficient coupling cannot be obtained by this adjustment, remove the r-f unit side shield and loosen the round-head screw located on the vertical support bar for the coupling loop (L107). Raise the coupling loop assembly slightly (approximately ⅛ inch), tighten the round-head screw, and replace the side shield. Again adjust control "F" for correct coupling. If necessary, raise the coupling loop assembly again. Repeat these procedures until proper coupling is obtained. Then tighten the cap screws on the bottom of the oscillator compartment. Check again to see that the "H.F. OSC. PLATE CURRENT" meter (M104) is indicating a value between 100 and 105 milliamperes.

Warning—When adjusting the position of the coupling loop L107 make certain that L107 is always 1/16 inch to the front of the shorting bar on the cathode line, i.e., between the shorting bar and the tubes.

4.66 The h-f oscillator trimmer disc (C127) should be spaced about 1/4 inch from the filament lines to permit a maximum amount of future adjustment. Any frequency change caused by the movement of this trimmer may be compensated for by adjustment of the effective length of the grid lines as previously described.

NOTE—While making the adjustments just described, be certain that the h-f oscillator frequency is reset at 246 megacycles after each adjustment which tends to detune the stage.

4.67 When the adjustments have all been completed, replace the lead to number 1 terminal of terminal board "A." When the transmitter is again placed in operation, check the output frequency.

4.68 In order to monitor the modulator output, set the "CAL.-MON." switch (S102) in the "MON." position. Insert the headphone plug, in the "PHONES" jack on the front panel, and tune the control "E" ("MONITOR TUNING") until a beat note is heard. The output of the monitor is also run to the jack (J401) in the antenna control unit.

4.69 A calibration chart is mounted on the door of the transmitter so that dial settings may be recorded once they have been established. Should the dial setting for control "A" change due to a replacement of the oscillator tube (V101), it may be restored to the previous indication by adjusting control "B." This control is adjusted by means of a screwdriver and should be locked after properly adjusted. The capacitor C132, located in the output tank circuit of the modulator-oscillator, has been adjusted by the manufacturer, to resonate at approximately 685 kc which is the center of the modulator frequency range and is locked in position. Do not disturb this adjustment.

V
OPERATION

5.1 **Warning**—Operation of this equipment involves the use of high voltages which are dangerous to life. Operating personnel must at all times observe all safety regulations. See the section headed "Safety" which is located at the front of this instruction book. Do not change tubes or make adjustments inside equipment with high voltages on.

5.2 It is assumed that the equipment has been installed, adjusted and tuned to the desired frequency as described in Section IV ("Installation") of this book.

5.3 To place the equipment in operation:

(1) Operate the "LINE" switch (S201) to the "ON" position. The time delay relay (K201) should close in 40 seconds.

(2) When the time delay relay has closed, operate the "PLATE" switch (S204) to the "ON" position.

(3) Set the "TEST KEY" (S101) in the center open position.

(4) To monitor the signal, insert the headphone plug in the "PHONE" jack (J101) and tune control "E" ("MONITOR TUNING") until a beat note is obtained. The "CAL.-MON." switch (S102) should be in the "MON." position.

(5) Keep the "SHIP COURSE" dial on the antenna control unit set at the same indication that is observed on the compass repeater.

5.4 To shut down the equipment:

(1) Operate the "PLATE" switch (S204) to the "OFF" position.

(2) Operate the "LINE" switch (S201) to the "OFF" position.

5.5 If operation of the thermal heaters in the three units is desired, throw the "HEATER" switch (S202) in the power supply to the "ON" position.

VI
MAINTENANCE

6.1 **ROUTINE MAINTENANCE**—A maintenance schedule strictly adhered to will be helpful in keeping the equipment in good condition. The following schedule is suggested:

6.2 Daily

(a) Check the control circuits for proper operation.

(b) Check and record all meter readings.

(c) Check the carrier and modulating frequencies.

(d) Dust off the exterior surfaces of the equipment.

6.3 Weekly

(a) Dust the entire equipment, inside and outside.

(b) Check all electrical connections for tightness.

(c) Inspect and clean all relay contacts.

6.4 Monthly

(a) Check all tubes. This can be done by comparing the daily meter readings taken over a considerable time. The end of the useful life of a tube is usually gradual and is evidenced by reduced plate current for that stage when other conditions are normal. Thus by checking plate current readings against previous readings, tube failures may be anticipated and the tubes replaced before an outright failure occurs.

(b) Polish the frequency meter "dial" as described under the heading "Frequency Meter" in this "Maintenance" section.

(c) Inspect the antenna assembly. Examine the antenna array for loose mechanical parts. Remove any dust or moisture which has accumulated within the pedestal-housing.

(d) Remove the gear box **drain** plug. If no grease flows out, add enough Esso W. S. 334 oil to bring the gear box content up to this level. Insert approximately 10 drops of Navy Type 1047 Lubricating Oil in each oil cup on the motor.

(e) Clean the breaker contacts, using a clean cloth moistened with a volatile solvent (such as carbon tetrachloride). Check the contact spacing and adjust the contacts, if necessary, for the correct spacing. (The procedure for this is given in the "Installation" section of this book.) When the contact spacing is correct, apply a thin film of petrolatum to the contact surfaces.

6.5 Quarterly

(a) Inspect contacts of the antenna control unit and antenna assembly switches. If these appear rough or pitted, they should be smoothed by means of a fine file or a contact burnishing tool.

(b) Apply 2 drops of a high grade, naphthenic base, water white mineral oil (such as Socony-Vacuum Industrial White Oil No. 313) to all shaft bearings, in order to protect ball races against corrosion.

(c) Apply petrolatum (or Navy Type 14P1c grease) to all worms and worm wheels. It is advisable first to remove any old lubricant by means of a clean brush dipped in high grade water white kerosene.

(d) Oil all meshing gear surfaces with a high grade, waterproof gear lubricant, Essoleum chassis lubricant "H" or equivalent.

6.6 Semi-Annually

(a) Inspect, and if necessary, replace the wiping contacts of the transmission line coupling.

(b) Lubricate the antenna assembly bearing and transmission line coupling (through the two grease fittings provided) with Navy Type 14L3 grease.

6.7 Annually

(a) Repack the antenna assembly motor bearings with Navy Type 14L3 grease.

(b) Drain the lubricant from the antenna assembly gear box. Replace with 1 pound of Esso WS334 oil.

6.8 **RADIO TRANSMITTER**—Proper appearance of the radio transmitter unit may be maintained by carefully dusting the entire exterior surface daily with a soft dry cloth.

6.9 Interior surfaces should also be cleaned carefully with a soft dry cloth. When cleaning, be sure that no lint remains on the surfaces; also make certain that no parts are scratched and that no capacitor plates are deformed. If DRY compressed air is available, it may be used to blow dust out of the set. A bellows may also be used. When cleaning, do not pull or strain the wiring.

6.10 When painting in the vicinity of the transmitter, cover the latter to prevent the settling of paint globules. Do not paint over or attempt to refinish the exterior surfaces of the transmitter. With proper care, these finishes will last for years.

6.11 The operator should note that numerous items may be removed from the front panel without reaching around behind the panel. This is advantageous when access to the sides of the transmitter is limited.

6.12 **Vacuum Tubes:** ALL TUBES SUPPLIED WITH THE EQUIPMENT, OR AS SPARES ON THE EQUIPMENT CONTRACT, MUST BE USED IN THE EQUIPMENT PRIOR TO EMPLOYMENT OF TUBES FROM GENERAL STOCK. See bulletins at rear of this book for complete information on vacuum tubes used in this equipment.

6.13 An accurate record should be kept of all vacuum tubes, including the date of receipt, use intended, date placed in service, date of failure, number of hours operated and other pertinent information.

6.14 Do not chill the tubes by allowing the hot glass to come in contact with cold or wet surfaces as breakage may result.

6.15 When inserting tubes in the sockets, do not allow them to snap into position. In all cases, careful handling and conservative operation will be amply repaid by long and uniform tube life.

6.16 DO NOT ADJUST THE ZERO INDICATION OF THE METERS WITH THE POWER ON, WHEN SERVICING THE RADIO TRANSMITTER UNIT **ALWAYS DISCHARGE THE FILTER CAPACITORS** SINCE THEY MAY BE HOLDING DANGEROUS CHARGES EVEN THOUGH THE TRANSMITTER HAS BEEN SHUT DOWN. FOR THIS PURPOSE, IT IS DESIRABLE TO HAVE A GROUND STICK (A ROD OF INSULATING MATERIAL, HAVING A FLEXIBLE BRAID CONNECTED BETWEEN ONE END AND GROUND) SO THAT THE HIGH VOLTAGE MAY SAFELY BE GROUNDED.

6.17 Inspect the relays regularly for rust, noise and condition of contacts. If the contacts are rough, smooth them carefully with a jeweler's file or crocus cloth, rounding the surface so as to leave no sharp contact points. If the contacts are badly burned, replace them with spare contacts.

6.18 If rust should appear on the armature or pole faces of the relays, it should be cleaned away carefully; otherwise the relay may be noisy. If necessary, a very light coating of petrolatum may be applied to the pole faces.

6.19 ANTENNA ASSEMBLY—After a long period of continued operation, it is well to check the motor synchronizing switch for proper contact clearance to insure proper operation (refer to Figure 27). This operation is described in detail in Paragraph 4.9 and the routine should be closely followed.

6.20 Antenna Matching Unit—To replace the packing gasket or the electrical wiping contacts in the gas-tight transmission line rotary coupling of the antenna assembly, it will be necessary to disassemble this unit. The following procedure is recommended.

(1) Using a 7/16 inch wrench, remove the 2 nuts that fasten the di-pole electrical connections on the "far" end of the antenna matching unit.

(2) Using a 1/2 inch wrench, remove the 4 nuts and bolts holding the antenna matching unit to the frame of the antenna array.

(3) Using a 7/16 inch wrench, remove the 4 bolts on the top surface of the transmission line rotary coupling. The top section may then be lifted off.

6.21 The wiping electrical contact for the inner conductor is soldered in the top section of transmission line. Unsolder the old contact and resolder a new one in its place. The wiping electrical contact for the outer conductor is sprung into position within the coupling. This should be pulled out and the new contact forced into place.

6.22 By removing the flat metal ring, the packing is uncovered, and is thus accessible for replacement when this is necessary.

6.23 FREQUENCY METER—The frequency meter is a delicate instrument which will stand normal handling and ship vibration, but will not stand severe shock or fall. Adjustments to the resonant line section should not be attempted unless a 246 megacycle source is available for recalibration of the instrument. A frequency standard or a correctly tuned transmitter will do for a frequency source.

6.24 To recalibrate the frequency meter, set the micrometer dial to exactly "0.500." Feed a 246 megacycle signal into the instrument through the coaxial cable. Loosen the nut designated "LOCK NUT" on Figure 34, and rotate the "CALIBRATION ADJUSTMENT SCREW" until the microammeter shows a maximum deflection. **Keep the input at a low enough level that the microammeter indication is on the lower portion of its scale. As resonance is approached, make the adjustments slowly and reduce the input level if the meter pointer shows a tendency to go off scale. An overload may burn out the crystal.** When resonance (maximum microammeter deflection) is obtained, tighten the "LOCK NUT."

6.25 If the micrometer dial scale is not in a convenient position for reading, the dial may be rotated to correct this condition after the "DIAL SET SCREW" has been loosened. When the dial is thus correctly positioned, the set screw should be tightened. The scale on the barrel of the dial should face in the same direction as the microammeter scale. Recheck the calibration of the instrument after this adjustment has been made. If the micrometer dial develops backlash disassemble the micrometer as described in Paragraph 6.28. Remove the "dial" assembly, and unscrew the thimble (counter-clockwise) until it comes away from the barrel. Tighten the round nut on the end of the barrel a fraction of a turn, using the spanner wrench supplied in the carrying case. Then reassemble the instrument and check the operation of the dial. If backlash is not considerably reduced, repeat this procedure. THE SPANNER WRENCH SUPPLIED IN THE FREQUENCY METER CASE IS TO BE USED ONLY FOR THIS ADJUSTMENT.

6.26 A spare crystal is supplied, clamped on the inside of the "FRONT COVER" (refer to Figure 22A). A defective crystal is indicated by a weak, or no deflection of the microammeter.

6.27 If the Ball Bearings become loosened, remove the end cap of the frequency meter and tighten the "TAKE-UP NUTS" or the "END SCREW" until there is no "end lash" of the main shaft, but it still rotates freely. Then replace the end cap and recalibrate the instrument.

6.28 If the "CLAMP NUTS" become loosened, unscrew the "END SCREW," the "TAKE-UP NUTS," and then the "CALIBRATION AD-

JUSTMENT SCREW." Position the "DIAL SHAFT" and the "MAIN SHAFT" in the "CLAMP COLLAR" so that the former extends 0.125 inch into the collar, and the latter 0.250 inch. Then tighten the clamp nuts securely. If the length of the "CALIBRATION ADJUSTMENT SCREW" that protrudes beyond the "LOCK NUT" is noted before this operation is performed, and the same length is left protruding after reassembly, then this screw should be close to the position for correct calibration. Recalibrate the instrument after this adjustment.

6.29 A rust-preventive solution is included in a small can clamped to the cover of the frequency meter case. Polish the frequency meter "dial" with a soft cloth moistened with this solution each time (immediately after) the frequency meter is used. Never leave finger prints showing on the "dial," when the frequency meter is stored, as they may "etch" into the steel.

NOTE—Do not attempt any adjustments on the frequency meter unless proper facilities and test equipment are available. Adjustments or repairs on the resonant line assembly will necessitate recalibration of the instrument before it can again be depended upon for accurate indications.

6.30 Replacement of Crystal Detector—To replace the crystal detector in the frequency meter proceed as follows:

(1) Unscrew the flat, knurled "DISASSEMBLY NUT" (shown in Figure 22A). This operation will lift the cap assembly, and both nut and cap may be lifted off as a unit.

(2) Unscrew the "LOOP MOUNTING SCREW" (see Figure 22A) and then loosen the two "CRYSTAL BASE CLAMPING SCREWS." Slide the crystal base out from under the clamp, and remove the crystal and the pick-up loop (L602) from the frequency meter.

NOTE—Handle the pick-up loop carefully. Be careful not to twist or bend it.

(3) Loosen the "CRYSTAL TIP CLAMP SCREW" (See Figure 22A), and remove the crystal cartridge from the clamping collar.

(4) Replace the crystal cartridge.

(5) Reassemble the frequency meter in the reverse order of its disassembly.

6.31 ANTENNA CONTROL UNIT — The thumb nut which clamps the "SHIP COURSE" dial may, in time, become loosened due to vibration. The condition of this nut should be checked periodically. If the nut has become loose, retighten it ONLY AFTER THE DIAL CALIBRATION HAS BEEN CHECKED, and the dial has been reset, if necessary, with reference to the direction of the transmitted signal.

6.32 OPERATIONAL FAILURE—The following notes are included to aid the radio man in promptly determining the cause of abnormal conditions and in effecting the repair in the shortest possible time. The troubles and procedures for locating the causes follow:

6.33 Filaments of rectifier tubes (V201, V202) do not light.

(a) Make certain that power is being supplied from the 115 volt a-c line.

(b) Check the continuity of the "LINE" switch (S201).

(c) Make certain that the fuses (F201, F202) have not blown.

(d) Check the continuity of the "FILAMENT VOLTAGE" rheostat (R202).

(e) Check the plate transformer (T201) and the rectifier tube sockets (X201, X202) for loose connections.

(f) Check the filaments of the rectifier tubes for continuity.

6.34 Dehumidifying heaters do not operate.

(a) Make certain that connections on the link board in the power supply are made correctly and are tight.

(b) Make certain that the fuses (F203, F204) have not blown.

NOTE—The heaters should not operate when the temperature inside the equipment is above 120° F. (49° C.).

6.35 Plate voltage is not present.

(a) Push the overload relay (K202) "RESET" button. If plate voltage is still not obtained check the contacts of the relay (K202).

(b) Check the fuses (F201, F202).

(c) Check the time delay relay action and the contacts. Approximately 40 seconds is required for the relay to close after it is energized.

(d) Check the condition of the "PLATE VOLTAGE" rheostat (R201).

6.36 Overload relay trips.

(a) Check the high-voltage circuits for a short-circuit.

(b) If the high-voltage is not short-circuited, check the current at which the relay opens. Should this be approximately 350 ma, rotate the screwdriver-slotted shaft of the variable resistor (an integral part of the relay) until the correct adjustment of the relay is obtained.

6.37 Carrier, but no code signal, is transmitted.

(a) Check the operation of the keying relay (K101). Clean and burnish the contacts if they appear blackened or pitted.

(b) Check the continuity of resistor R116.

(c) Check the condition of the modulator oscillator tube (V101).

(d) Check the screen voltage supply lead choke (L103) for an open circuit.

(e) Check the grid leak resistor (R101) for an open circuit.

6.38 Modulator-Amplifier does not tune properly.

(a) Check the condition of the modulator-amplifier tube (V102).

(b) Check for modulator-amplifier grid voltage excitation from the modulator-oscillator.

(c) Check the voltage at the tube socket terminals.

(d) Check for continuity of the screen voltage dropping resistor (R105) and the cathode resistors R104 and R118.

6.39 Carrier-Oscillator does not operate.

(a) Check the continuity of the grid leak resistor (R106).

6.40 Low power output.

(a) Check all plate and filament voltages.

(b) Check the output coupling, as described in Section V ("Installation").

6.41 Monitor not operating.

(a) Check the tightness of the connections on terminal board "F."

(b) Check the condition of the monitor-converter tube (V301).

(c) Check for the proper voltages at the tube socket terminals.

(d) Make certain that "CAL.-MON." switch is in the "MON." position.

6.42 Frequency Meter does not operate.

(a) Check the operation of the microammeter.

(b) Substitute the spare crystal rectifier.

TABLE IV

SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS

FOR MODEL YG-1 HOMING BEACON EQUIPMENT
EQUIPMENT SPARES

CONTRACT NXss-19219

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA MFG. CO. DRAWING & PART NUMBER
					MISCELLANEOUS (CLASS 10)					
1	2	4		E501	Contact, phosphor bronze, 0.187" dia. 2" long		40	559911-1		K-875134-1
2	2	24		H501	Cotter pin, brass, 1/16" x 3/4" long		40	560774	Fin. #100	K-59228-53
3	2	16		H502	Nut, bronze, 1/2" hex., 21/64" thick, 5/16"-18 threads		41		Fin. #100	K-875059-1
4	2	4		H503	Washer, vellutex, 1/32" thick, I.D. 0.261", O.D. 3/4"		35			K-860618-35
5	2	25		H504	Cotter pin, brass, 3/32" x 3/4" long		23		Fin. #100	K-59228-57
6	2	12		I401A	Lamp, candelabra base, clear, 115 v, 6 watts	-TS37	24			K-875236-267
7	2	1		I401B	Lens, pyrex, white, 2 ply glass, 1 ply cellulose acetate, 5/32" thick, 1.031" dia.	-12G5	21			K-874881-2
8	2	1		I402	Lens, red, 2 ply glass, 1 ply 0.031" thick celluloid, 0.375" thick, 3.031" dia.	-12G5	16			K-874882-1
9	2	1		O401	Gasket, rubber, 1/4" thick, 44-3/8" long, 3/8" bevel each end, 20-30 durometer reading	-33R1	43			K-876510-444
10	2	1		O402	Gasket, neoprene, 1/32" thick, 3-9/16" wide, 9-5/16" long, 10 holes, 0.281" dia., 30-40 durometer reading		11			M-422606-1
11	2	2		O403	Gasket, soft rubber, 3/64" thick, I.D. 7/8", O.D. 1-1/16"	-33R1	43			K-874884-1
12	2	2		O404	Gasket, soft rubber, 0.078" thick I.D. 2-1/2", O.D. 3-1/16"	-33R1	43			K-874883-1
13	2	1		O405	Gasket, neoprene, 1/32" thick, I.D. 1-25/32", O.D. 2-3/4", 4 holes, 0.203" dia., 30-40 durometer reading		43	M-1-8843		K-875220-1
14	2	1		O406	Seal, 1/2" dia., shaft, 1.125" dia. bore, 3/8" width	12-Z-362	18			K-875236-261
15	2	1		O407	Gasket, neoprene, 0.031" thick, I.D. 1-17/32", O.D. 2-3/16", 4 holes 0.173" dia., 30-40 durometer reading		43	M-18843		K-875228-1

TABLE IV (Continued)

SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS

FOR MODEL YG-1 HOMING BEACON EQUIPMENT
EQUIPMENT SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA MFG. CO. DRAWING & PART NUMBER
					MISCELLANEOUS (CLASS 10)					
16	2	1		0408	Gasket, rubber, 3/16" thick, I.D. 1-1/8" O.D. 1-1/4"	-33R1	43			K-875517-1
17	2	1		0409	Gasket, rubber, 3/32" thick, I.D.13/32" O.D. 1/2"	-33R1	43			K-875516-1
18	2	1		0501	Insulator cap, mycalex, 1/2" thick, O.D. 3-3/4"		13			K-874780-1
19	2	1		0502	Gasket, neoprene, 1/8" thick, I.D. 2-1/2", O.D. 3-3/4"		6			K-874781-1
20	2	4		0503	Gasket, neoprene, 1/8" thick, I.D. 17/64", O.D. 5/8"		43	M-18840		K-874782-1
21	2	1		0504	Revolving joint, 2-1/8" dia., overall length 18-7/16"		7	#JS4902 Style 2		M-422905-2
22	2	1		0504A	Set of brushes including springs (6 per set)		7	#JS4969		K-876704-1
23	2	1		0504B	Needle bearing		7	#JS4966		K-876706-1
24	2	1		0504C	Set of packing (5 per set)		7	#JS4952		K-876705-1
25	2	1		0505	Packing, 3/8" thick, I.D. 1-3/8", O.D. 2.254", aluminum case	12-Z-362	18			K-874558-2
26	2	1		0506	Retaining ring, 0.059" music wire, O.D. 2-5/16"		26	WD-1085	Fin. #010	K-67893-24
27	2	1		0507	Packing, braided asbestos treated with lubricating compound and graphite, 1/4" square, 3-1/2" long		19	Cat.#141B		K-875035-5
28	2	1		0509	Packing, 3/8" thick, I.D. 9/16", O.D. 1.378", aluminum case	12-Z-362	18			K-874558-3
29	2	1		0510	Gasket, medium soft rubber, 3/32" thick I.D. 9-1/4", O.D. 10"	-33R4A	6			K-874589-1
30	2	1		0511	Gasket, medium soft rubber, 5/16" thick I.D. 1-3/8", O.D. 1-5/8"	-33R4A	10			K-874842-1
31	2	1		0512	Key, cold rolled steel, 0.187" square 2" long		40	559797-1	Fin. #010	K-874834-1
32	2	1		0513	Key, cold rolled steel, 0.125" square 1" long		40	559797-3	Fin. #010	K-874834-3

TABLE IV (Continued)

SPARE PARTS LIST BY NAVY TYPE DESIGNATION

FOR MODEL YG-1 HOMING BEACON EQUIPMENT
EQUIPMENT SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA MFG. CO. DRAWING & PART NUMBER
					MISCELLANEOUS (CLASS 10) (Continued)					
33	2	1		0514	Retaining ring, 0.059" music wire, O.D. 1-7/16"		26	WD-1085		K-67893-23
34	2	3		0515	Packing, braided asbestos treated with lubricating compound and graphite, 5/16" square, 7-3/8" long		19	Cat.#141B		K-875035-4
35	2	3		0516	Packing, braided asbestos treated with lubricating compound and graphite, 3/16" square, 3-1/2" long		19	Cat.#141B		K-875035-3
36	2	1		0517	Gasket, rubber, 1/4" thick, 44" long, 3/8" bevel on each end		6			K-874845-1
37	2	4		0518	Bushing, brass, O.D. 3/16", 0.016" wall thick		4	#560465-102		K-875082-5
38	2	3		S402A,403A,404A	Contact arm assembly		40	G-561041		K-876306-501
39	2	6		S402B,403B,404B	Contact, tungsten tipped, 1/4"-20 threads, 0.557" long		31	EC30A		K-875181-1
40	2	1		S405	Synchronizing switch assembly, cam operated, S.P.D.T.		40	G-559650		M-422576-501
41	2	1		S501 & 502	Synchronizing switch assembly, cam operated, S.P.D.T.		40	G-559798		M-422544-501
42	2	1			Set screwdriver		9			K-876254-1
43	2	1			6" screwdriver		9			K-876249-1
44	2	1			12-1/2" screwdriver		41	519		K-876249-2
45	2	1			Offset screwdriver		22			K-876251-1
46	2	1			Open end wrench, 1/4" and 5/16"		41	M-1020		K-876248-1
47	2	1			Open end wrench, 1/4" and 1/4"		25			K-876250-1
48	2	1			4 oz. can glyptal		12	#S-2015L		K-875236-317
49	2	1			4 Oz. can antisieze compound		30			-69240-20
50	2	1			8 oz. can white petrolatum		8			K-875236-319
51	2	1			16 oz. can deo-base cleaning solvent		32			K-875236-320

TABLE IV (Continued)

SPARE PARTS LIST BY NAVY TYPE DESIGNATION

FOR MODEL YG-1 HOMING BEACON EQUIPMENT
EQUIPMENT SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA MFG. CO. DRAWING & PART NUMBER
					MISCELLANEOUS (CLASS 10) (Continued)					
52	2	1			16 oz. can industrial white oil, #313 lubrication		8			K-875236-321
53	1	1			Wrench, for #6 fluted set screw, shank 1-27/32", arm 21/32"		41			K-860519-2
54	2	1			Wrench for #10 fluted set screw, shank 2-3/32", arm 3/4"		41			K-860519-4
55	2	1			Wrench for 1/4" fluted set screw, shank 2-11/32", arm 27/32"		41			K-860519-5
56	1	1			Support consisting of mycalex block and four brass rods		40	G-559987		K-874702-501
57	1	1			Strap, mycalex, 1/4" thick, 1-1/4" wide, 2-7/16" long		28			K-874924-1
58		2			Spare parts boxes, #1 and #2		33			T-620059-507
					METERS (CLASS 22)					
59	1	1	CTO-22057	M101,105	Milliammeter, d.c., scale 0-50 bakelite case, non-glare glass, flush mounted, 2-1/2" dia.	17-I-12b	42	Model 0222 T-0-50		M-421307-1
60	1	1	-22079	M103	Voltmeter, a.c., scale 0-10, bakelite case, non-glare glass, flush mounted, 2-1/2" dia.	17-I-12b	42	Model 232		M-421307-10
61	1	1	CTO-22146	M201	Voltmeter, d.c., scale 0-750, 1000 ohms per volt, internal multiplier, anti-glare glass, flush mounted, 3-1/2" dia.	17-I-12b	42	Model 0321 0-750		M-418316-30
62	1	1	CTO-22238	M102,104	Milliammeter, d.c., scale 0-300, bakelite case, non-glare glass, flush mounted 2-1/2" dia.	17-I-12b	42	Model 0222 T-0-300		M-421307-7

TABLE IV (Continued)

SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS

FOR MODEL YG-1 HOMING BEACON EQUIPMENT
EQUIPMENT SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA MFG. CO. DRAWING & PART NUMBER
					METERS (CLASS 22) (Continued)					
63	1	1	-22238	M601	Microammeter, d.c., scale 0-200, metal case, non-glare glass, flush mounted, 2-1/2" dia.	17-I-12b	42	Model 0222 T-0-200		M-422603-1
					SWITCHES (CLASS 24)					
64	1	1		S102	Switch, toggle, D.P.D.T., lever and threads bright nickel plated, contacts silver plated, rated 3 amps., 250 v		5	#20905FA		M-413702-9
					FUSES (CLASS 28)					
65	1	2		F201,202,203,204	Fuse, 10 amps., 250 v, cartridge type		24	P9460		K-875207-19
66	1	10		F201A,202A,203A,204A	Fuse refills, 10 amps., 250 v		24	#GE1099		K-860218-32
					RELAYS (CLASS 29)					
67	1	1		K101	Relay, S.P.S.T., normally open, coil rated 115 v, 50 to 60 cycles, 1/4" dia. silver contacts		1	#101K		K-875066-1
68	1	1		K201	Relay, adjustable delay, 30 to 60 sec., normally open, coils rated 115 v a.c., 50-60 cycles		29	Type R-300		M-422748-1
69	1	1		K202	Relay, manual reset, D.P.S.T., normally closed, 250 to 500 ma, 1/4" dia. silver contacts		1	#700A		M-422579-1

TABLE IV (Continued)

SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS

FOR MODEL YG-1 HOMING BEACON EQUIPMENT
EQUIPMENT SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA MFG. CO. DRAWING & PART NUMBER
					*** VACUUM TUBES (CLASS 38)**					
70	1	1	-6SA7	V301	Vacuum tube, pentagrid converter base, small wafer octal 8 pin, metal shell bulb, miniature cap, heater current 0.3 amp. at 6.3 v a.c. or d.c.		36B	-6SA7		
71	1	2	-807	V101,102	Vacuum tube, r-f power amplifier and oscillator, base medium 5 pin, micanol, small metal cap, heater current 0.9 amp., at 6.3 v a.c. or d.c. plate dissipation 25 watts max.		36B	-807		
72	1	2	-836	V201,202	Vacuum tube, half-wave, high-vacuum rectifier, base, medium 4 pin bayonet, medium metal cap, heater current 5.0 amps. at 2.5 v a.c.		36B	-836		
73	1	4	-8025	V103,104	Vacuum tube, r-f power amplifier and oscillator, base, small 4 pin, terminal #1 - filament, terminal #2 - filament center tap, terminal #3 - not used, terminal #4 - filament, heater current 2.0 amps. at 6.3 v, plate dissipation 27 max. v		36B	-8025		
					INDUCTANCES (CLASS 47)					
74	1	1		L103	Choke coil, 0.728 mh, 208 turns of #26 SE copper wire, wound on molded bakelite coil form, 2 ohms		40	G-560392		K-874951-502
75	1	1		L104	Choke coil, 5.0 mh, 475 turns of #26 SE copper wire, wound on molded bakelite coil form, 6 ohms		40	G-560391		K-874951-501
76	1	1		L108	Choke coil, 1 copper wire coil and one 1/4 watt, 56 ohm resistor		40	G-560533		K-875486-501
77	1	1		L301	Choke, 2-1/2 mh, 50 ohms, d-c resistance, 125 ma		34	Type R100		K-834206-501

* Packed separately

TABLE IV (Continued)

SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS

FOR MODEL YG-1 HOMING BEACON EQUIPMENT
EQUIPMENT SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA MFG. CO. DRAWING & PART NUMBER
					CAPACITORS (CLASS 48)					
78	1	1	-48337-B2	C125	Capacitor, mica, 0.001 mfd ±2%, 5000 v, d.c. working	RE 48A 131C RE 48A 154F	37 or 39	F26S-521 Type 17		K-860215-11
79	1	2	-48382 -20	C120,123,133,203	Capacitor, mica, 0.01 mfd ±20%, 1200 v d.c. working	RE 48A 1120 RE 48A 154F	36A	Type BF		K-36172-501
80	1	1	-48690-10	C305,308	Capacitor, mica, 0.00025 mfd ±10%, 500 v d.c. working	RE 48A 148C RE 48A 154F	15	5WS		K-863187-18
81	1	1	-48839-10	C302	Capacitor, mica, 0.00007 mfd ±10%, 500 v d.c. working	RE 48A 148C RE 48A 154F	38	MOW.00007		K-863187-17
82	1	6	-481499-20	C118,119,121,124,126, 129,130,131,306,307, 310	Capacitor, mica, 0.01 mfd ±20%,1200 v d. c. working	RE 48A 293 RE 48A 154F	36A	855560-20		K-36336-14
83	1	8		C101,102,103,104,105, 106,107,108,109,110, 111,112,113,114,115, 116	Capacitor, ceramic, 315 mmfd ±6%		17	NO 50 HB		K-875246-1
84	1	1		C122	Capacitor, mica, 0.0002 mfd ±20%, 2500 v d. c. working	RE 48A 293 RE 48A 154F	36A			K-36336-3
85	1	1		C128,201	Capacitor, pyranol, 8.0 mfd, 1000 v d.c. working		20	#29		M-418141-16
86	1	2		C204,401,501	Capacitor, paper, oil filled, 0.5 mfd ±20%, 600 v d.c. working		15 or 38	-TS-6050-1 XKCRA6 .5-20		P-72049-507
87	1	2		C301,311,312	Capacitor, electrolytic, 10 mfd, 450 v d.c. working		39	#D-11023		K-875148-1
88	1	1		C304	Capacitor, mica, 1500 mmfd ±10%, 500 v d.c. working	RE 48A 143F RE 48A 154F	38	MWBW .0015		K-855560-4
					INSULATORS (CLASS 61)					
89	2	4		E503	Bushing, steatite, ceramic, 7/16" thick 17/64" I.D., 0.875" O.D.	RE 13A 317	3			K-874758-1

TABLE IV (Continued)

SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS

FOR MODEL YG-1 HOMING BEACON EQUIPMENT
EQUIPMENT SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA MFG. CO. DRAWING & PART NUMBER
					INSULATORS (CLASS 61) (Continued)					
90	2	2		E507,509	Insulator, ceramic, 3/16" thick, 1/4" I.D., 49/64" O.D.	RE 13A 317	3	W-9230B		K-856379-1
91	2	4		E508,510	Insulator unglazed steatite ceramic 5/32" thick, 0.187" I.D., 55/64" O.D.	RE 13A 317 Grade F	3			K-874831-1
					WIRES & CONDUCTORS (Class 62)					
92	2	6		W501	Ribbon, soft copper, 0.005" thick, 2-1/8" long		40	559873-1		K-874878-1
					RESISTORS (CLASS 63)					
93	1	1	-63288	R305	Resistor, fixed, composition, 22,000 ohms ±10%, 1 watt, insulated pigtail terminals	RE 13A 372G	27	122-2220-3		K-844314-78
94	1	1	-63288	R119	Resistor, fixed, composition, 56,000 ohms ±10%, 1 watt, insulated, pigtail terminals	RE 13A 372G	27	122-2560-3		K-844314-83
95	1	1	-63288	R304	Resistor, fixed, composition, 68,000 ohms ±10%, 1 watt, insulated pigtail terminals	RE 13A 372G	27	122-2630-3		K-844314-84
96	1	1	-63288	R303	Resistor, fixed, composition, 180,000 ohms ±10%, 1 watt, insulated pigtail terminals	RE 13A 372G	27	122-3180-3		K-844314-89
97		x	-63433	R120	Resistor, fixed, composition, 56 ohms ±10%, 1/4 watt, insulated pigtail, terminals, part of L108	RE 13A 372G	2	EB-5601		K-78726-47
98	1	1	-63474	R101	Resistor, fixed, composition, 15,000 ohms ±10%, 2 watts, insulated pigtail, terminals	RE 13A 372G	27	123-2150-3		K-844302-76
99	1	1	-63474	R103	Resistor, fixed, composition, 22,000 ohms ±10%, 2 watts, insulated pigtial, terminals	RE 13A 372G	27	123-2220-3		K-844302-78

TABLE IV (Continued)

SPARE PARTS LIST BY NAVY TYPE DESIGNATIONS

FOR MODEL YG-1 HOMING BEACON EQUIPMENT
EQUIPMENT SPARES

ITEM	BOX NO.	QUANTITY	NAVY TYPE NUMBER	ALL SYMBOL DESIGNATIONS INVOLVED	DESCRIPTION	NAVY DRAWING OR SPEC.	MFR.	MFR. DESIG.	SPECIAL TOLERANCE, RATING OR MODIFICATION	RCA MFG. CO. DRAWING & PART NUMBER
					RESISTORS (CLASS 63) (Continued)					
100	1	1	-63474	R116	Resistor, fixed, composition, 47,000 ohms ±10%, 2 watts, insulated, pigtail terminals	RE 13A 372G	27	123-2470-3		K-844302-82
101	1	1	-63474	R307	Resistor, fixed, composition, 180,000 ohms ±10%, 2 watts, insulated pigtail terminals	RE 13A 372G	27	123-3180-3		K-844302-89
102	1	1	-63703	R302	Resistor, fixed, wire wound, 220 ohms ±10%, 1 watt, pigtail terminals	RE 13A 372G	2	GB 2211		K-867971-354
103	1	1		R102	Resistor, fixed, composition, 22,000 ohms ±10%, 5 watts, lug terminals	RE 13A 372G	14			K-875231-1
104	1	2		R104,117,118	Resistor, fixed, composition, 200 ohms ±10%, 5 watts, lug terminals	RE 13A 372G	14			K-875231-2
105	1	1		R105	Resistor, fixed, composition, 50,000 ohms ±10%, 5 watts, lug terminals	RE 13A 372G	14			K-875231-3
106	1	3		R106,112,113,114,115	Resistor, fixed, composition, 2500 ohms ±10%, 5 watts, lug terminals	RE 13A 372G	14			K-875231-7
107	1	1		R107	Resistor, fixed, composition, 6500 ohms ±10%, 5 watts, lug terminals	RE 13A 372G	14			K-875231-4
108	1	1		R108,109	Resistor, fixed, composition, 12,000 ohms, ±10%, 5 watts, lug terminals	RE 13A 372G	14			K-875231-5
109	1	1		R110,111	Resistor, fixed, composition, 1000 ohms ±10%, 5 watts, lug terminals	RE 13A 372G	14			K-875231-6

Symbol numbers appearing on photographs identify all electrical items as well as many mechanical items. Only those items which are supplied as spares are listed in this preliminary instruction book. All items will be listed in the final instruction book

TABLE VI
LIST OF MANUFACTURERS
FOR MODEL YG-1 HOMING BEACON EQUIPMENT

CODE NUMBER	MFR. PREFIX	NAME	ADDRESS
1		Advance Electric Co.	Los Angeles, Calif.
2		Allen-Bradley	Milwaukee, Wisconsin
3		American Lava Co.	Chattanooga, Tenn.
4		Victor J. Andrews	363 E. 75th St., Chicago, Ill.
5	CHH	Arrow Hart & Hegeman Elec. Co.	Hartford, Conn.
6		Atlantic India Rubber Co.	1453 W. Van Buren, Chicago, Ill.
7		Barco Manufacturing Co.	1801 W. Winnemac Ave., Chicago, Ill.
8		G. Barr & Co.	1130 W. 37th St., Chicago, Ill.
9		Barrett-Christie Co.	108 N. Clinton St., Chicago, Ill.
10		Wm. Bowman Company	Cicero, Ill.
11		Chicago Belting Company	121 N. Green St., Chicago, Ill.
12		Chicago Bronze & Color Works	2639 W. Grand Ave., Chicago, Ill.
13		Colonial Kolonite	2212 W. Armitage Ave., Chicago, Ill.
14	CCC	Continental Carbon Co.	13900 Lorain Ave., Cleveland, Ohio
15	CD	Cornell-Dubilier	1000 Hamilton Blvd., So. Plainfield, N. J.
16		Dearborn-Glass Co.	2414 W. 21st St., Chicago, Ill.
17	CER	Erie Resistor Corp.	644 W. 12th St., Erie, Penn.

TABLE VI (Continued)
LIST OF MANUFACTURERS
FOR MODEL YG-1 HOMING BEACON EQUIPMENT

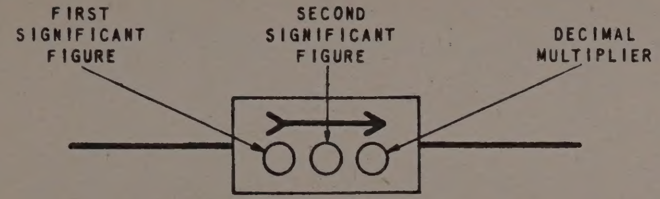
CODE NUMBER	MFR. PREFIX	NAME	ADDRESS
18		Garlock Packing Co.	Palmyra, New York
19		Goetze Gasket Co.	New Brunswick, N. J.
20		Graybar Electric Co.	500 S. Clinton St., Chicago, Ill.
21		A. W. Hornig Co.	2448 W. Fullerton Ave., Chicago, Ill.
22		Howe Ice Machine Co.	2825 W. Montrose Ave., Chicago, Ill.
23		M. D. Hubbard Spring Co.	Pontiac, Michigan
24		Hyland Electric Co.	700 W. Jackson Blvd., Chicago, Ill.
25		O. Iber Company	626 W. Randolph St., Chicago, Ill.
26		Industrial Spring Co.	1632 N. Wells St., Chicago, Ill.
27	CIR	International Resistor Co.	401 N. Broad St., Philadelphia, Penn.
28		E. F. Johnson Co.	Waseca, Minn.
29	CKU	Kurman Electric Co.	241 Lafayette St., New York, N. Y.
30		Magic Bros.	1640 W. Carroll Ave., Chicago, Ill.
31	CMA	P. R. Mallory Co.	Indianapolis, Indiana
32		Marquette Petroleum Products	7270 So. S. Chicago, Chicago, Ill.
33		Mayer Manufacturing Corp.	3130 W. 51st St., Chicago, Ill.
34	CNA	National Company	Malden, Mass.
35		Parisian Novelty	3510 S. Western Ave., Chicago, Ill.

TABLE VI (Continued)

LIST OF MANUFACTURERS
FOR MODEL YG-1 HOMING BEACON EQUIPMENT

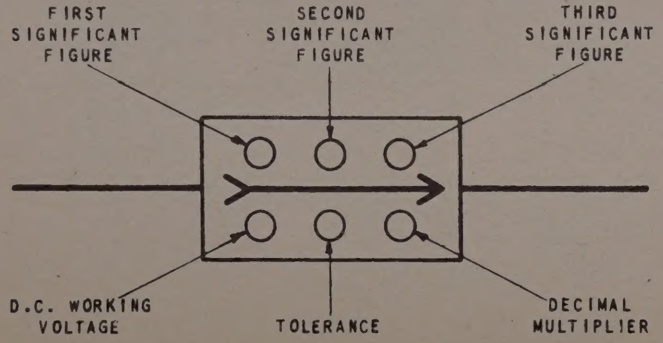
CODE NUMBER	MFR. PREFIX	NAME	ADDRESS
36A	CRV	RCA Manufacturing Co., Inc.	Camden, N. J.
36B	CRC	RCA Manufacturing Co., Inc.	Harrison, N. J.
37		Sangamo Electric Co.	Springfield, Ill.
38		Solar Manufacturing Co.	Bayonne, N. J.
39		Sprague Specialties Co.	North Adams, Mass.
40	CWS	Stewart-Warner Corporation	1826 Diversey Parkway, Chicago, Ill.
41		Supplies Inc.	564 W. Adams St., Chicago, Ill.
42	CTO	Triplett Electric Co.	Bluffton, Ohio
43		Western Rubber Co.	Goshen, Indiana

COLOR CODE IN MMFD. FOR CAPACITORS


FIRST SIGNIFICANT FIGURE
SECOND SIGNIFICANT FIGURE
DECIMAL MULTIPLIER

IN THE 3 DOT COLOR CODE THE WORKING VOLTAGE IS 500 V. D.C. AND TOLERANCE 20%

COLOR	NUMERAL	VOLTS	MULTIPLIER	TOLERANCE
BLACK	0		1	
BROWN	1	100	10	1%
RED	2	200	100	2%
ORANGE	3	300	1000	3%
YELLOW	4	400	10000	4%
GREEN	5	500	100000	5%
BLUE	6	600	1000000	6%
VIOLET	7	700	10000000	7%
GRAY	8	800	100000000	8%
WHITE	9	900	1000000000	9%
GOLD		1000	0.1	5%
SILVER			0.01	10%
NO COLOR		500		20%

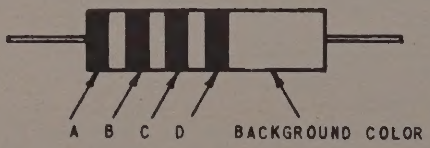

FIRST SIGNIFICANT FIGURE
SECOND SIGNIFICANT FIGURE
THIRD SIGNIFICANT FIGURE
D.C. WORKING VOLTAGE
TOLERANCE
DECIMAL MULTIPLIER

RMA COLOR CODE FOR RESISTORS

COLOR	A 1ST DIGIT	B 2ND DIGIT	C MULTIPLIER
SILVER			0.01
GOLD			0.1
BLACK		0	1.0
BROWN	1	1	10
RED	2	2	100
ORANGE	3	3	1000
YELLOW	4	4	10000
GREEN	5	5	100000
BLUE	6	6	1000000
PURPLE	7	7	10000000
GRAY	8	8	100000000
WHITE	9	9	

D - TOLERANCE CODE:

GOLD = 5% SILVER = 10% NO COLOR = 20%


A
B
C
D
BACKGROUND COLOR

NEW COLOR ARRANGEMENT FOR AXIAL LEADS

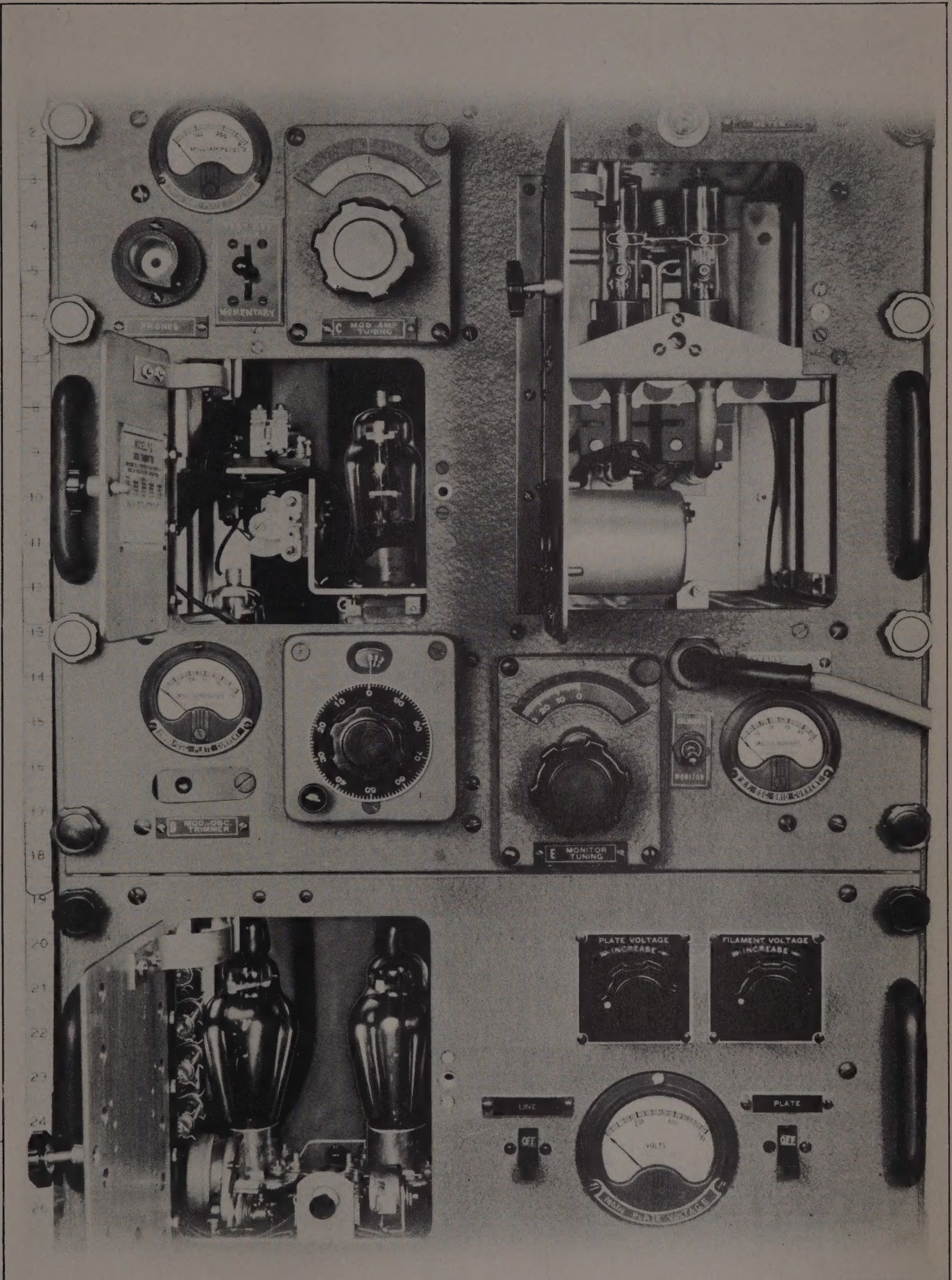

MILLIAMPERES
PHONES
MOMENTARY
C MOD. AMP. TUNING
D MOD.-OSC. TRIMMER
E MONITOR TUNING
MONITOR
PLATE VOLTAGE INCREASE
FILAMENT VOLTAGE INCREASE
LINE
PLATE
OFF
OFF
VOLTS
MAIN PLATE VOLTAGE
US-2620

Figure 3—Radio Transmitter (Front View, Doors Open)

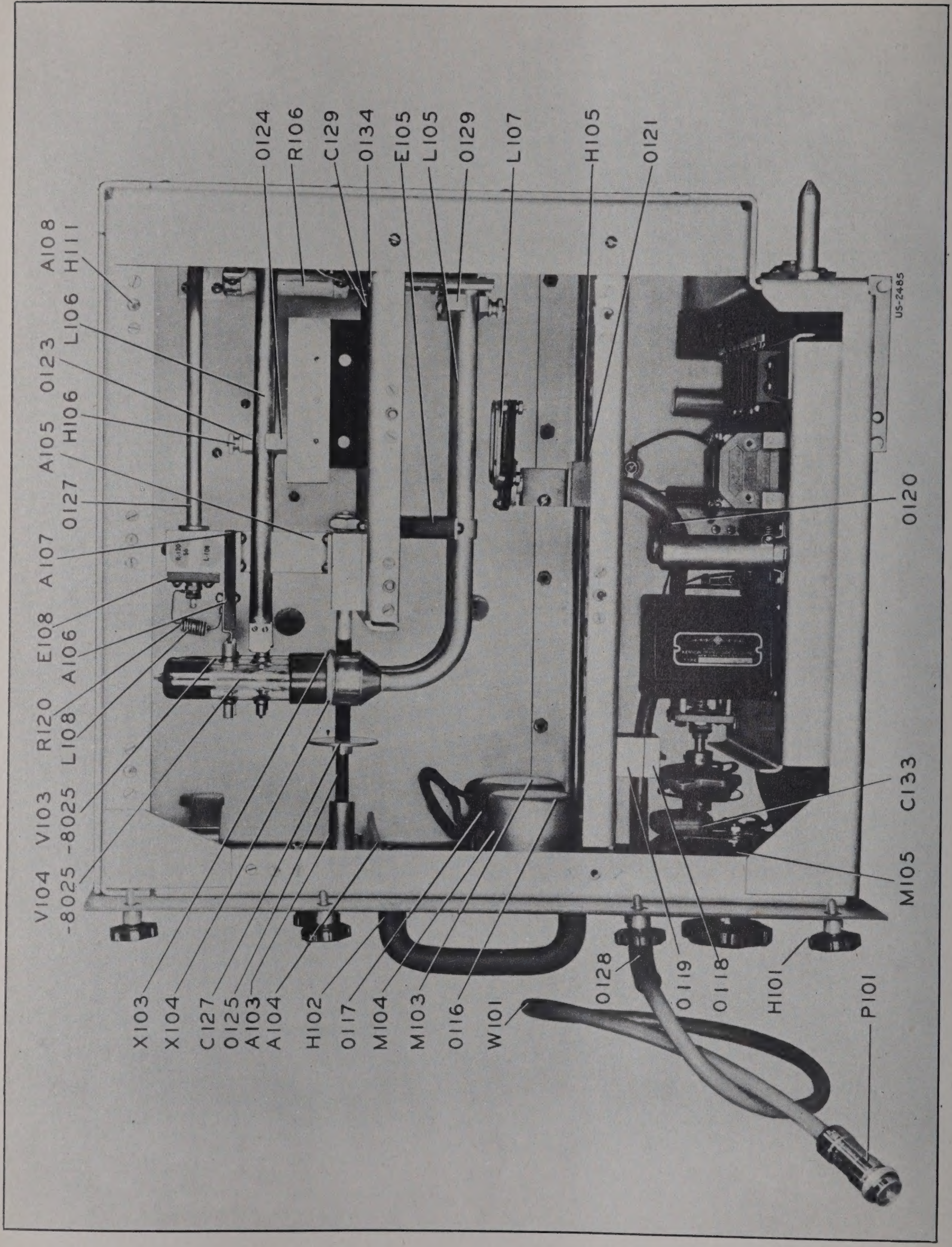

A108
H111
L106
0123
H106
A105
0127
A107
E108
A106
R120
L108
V103
-8025
V104
-8025
0124
R106
C129
0134
E105
L105
0129
L107
H105
0121
0120
C133
M105
X103
X104
C127
0125
A103
A104
H102
0117
M104
M103
0116
W101
0128
0119
0118
H101
P101
US-2485

Figure 4—Transmitter R-F Section (Right Side, Shield Removed)

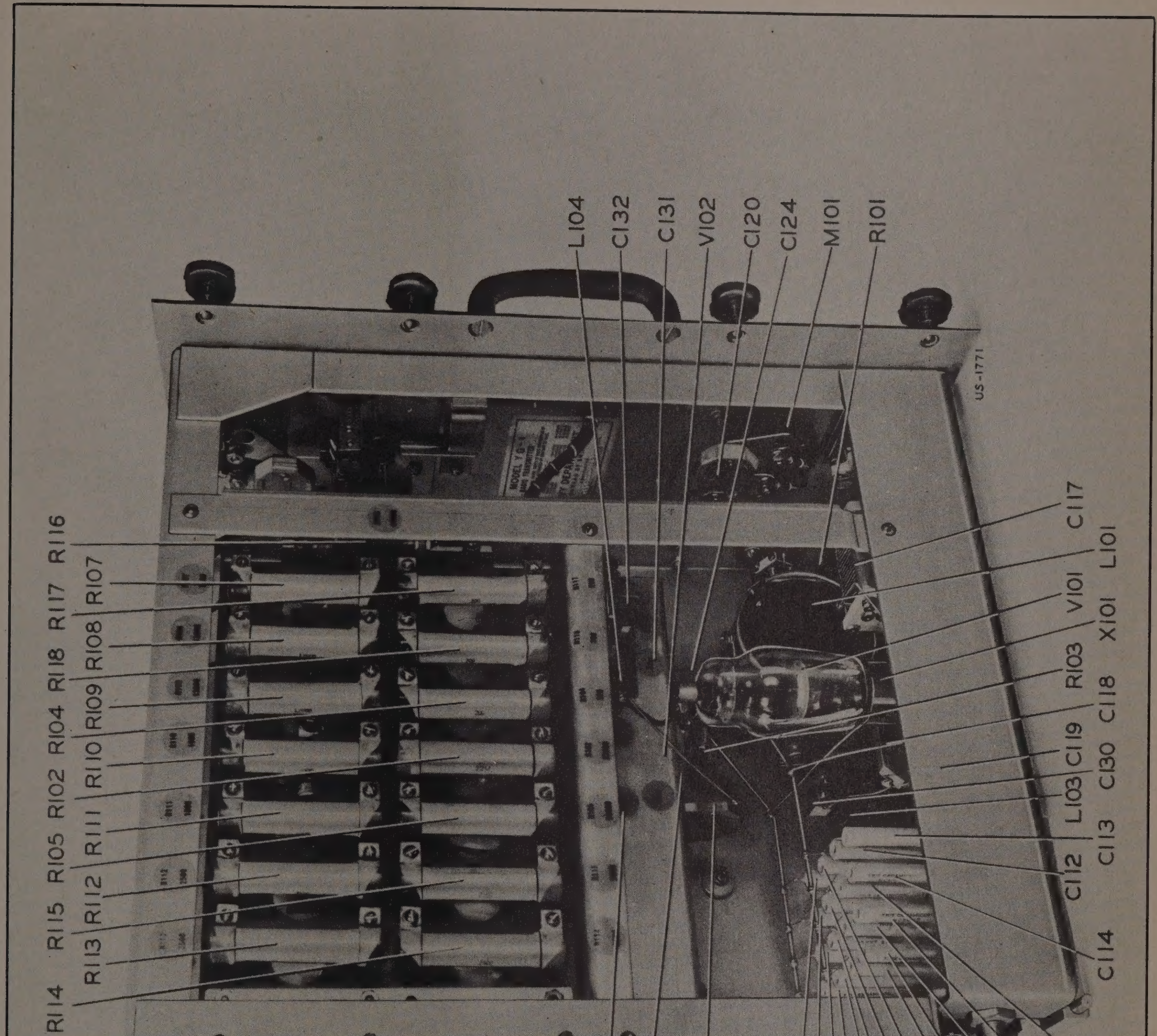

R114
R113
R115
R112
R105
R111
R102
R110
R104
R109
R118
R108
R117
R107
R116
L104
C132
C131
V102
C120
C124
M101
R101
C117
L101
V101
X101
R103
C118
C119
C130
L103
C113
C112
C114
C111
C115
C110
C116
C121
X102
C122
C104
C103
C102
C101
C108
C107
C106
C105
C109
US-1771

Figure 5—Transmitter R-F Section (Left Side)

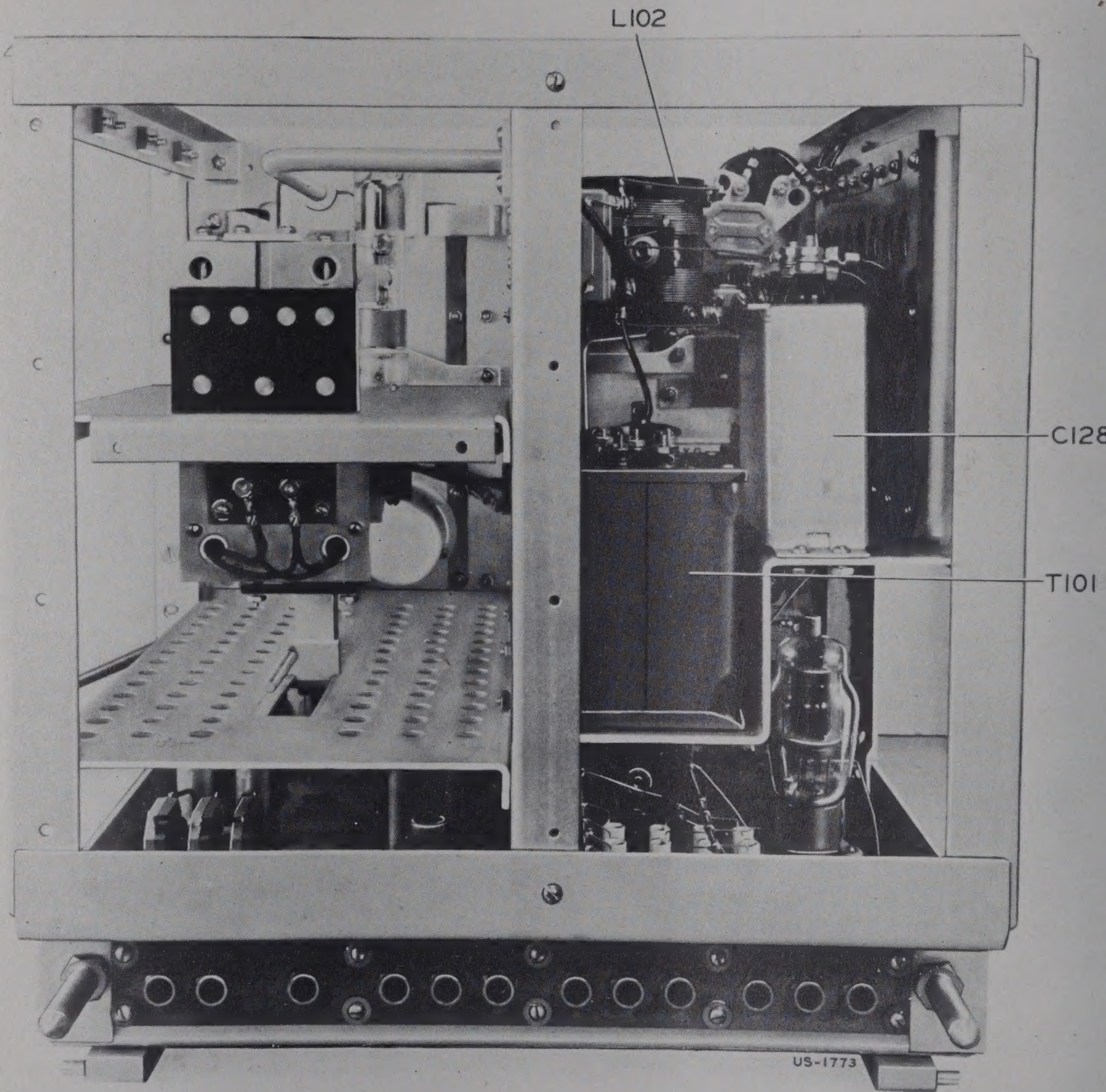

L102
C128
T101
US-1773

Figure 6—Transmitter R-F Section (Rear View)

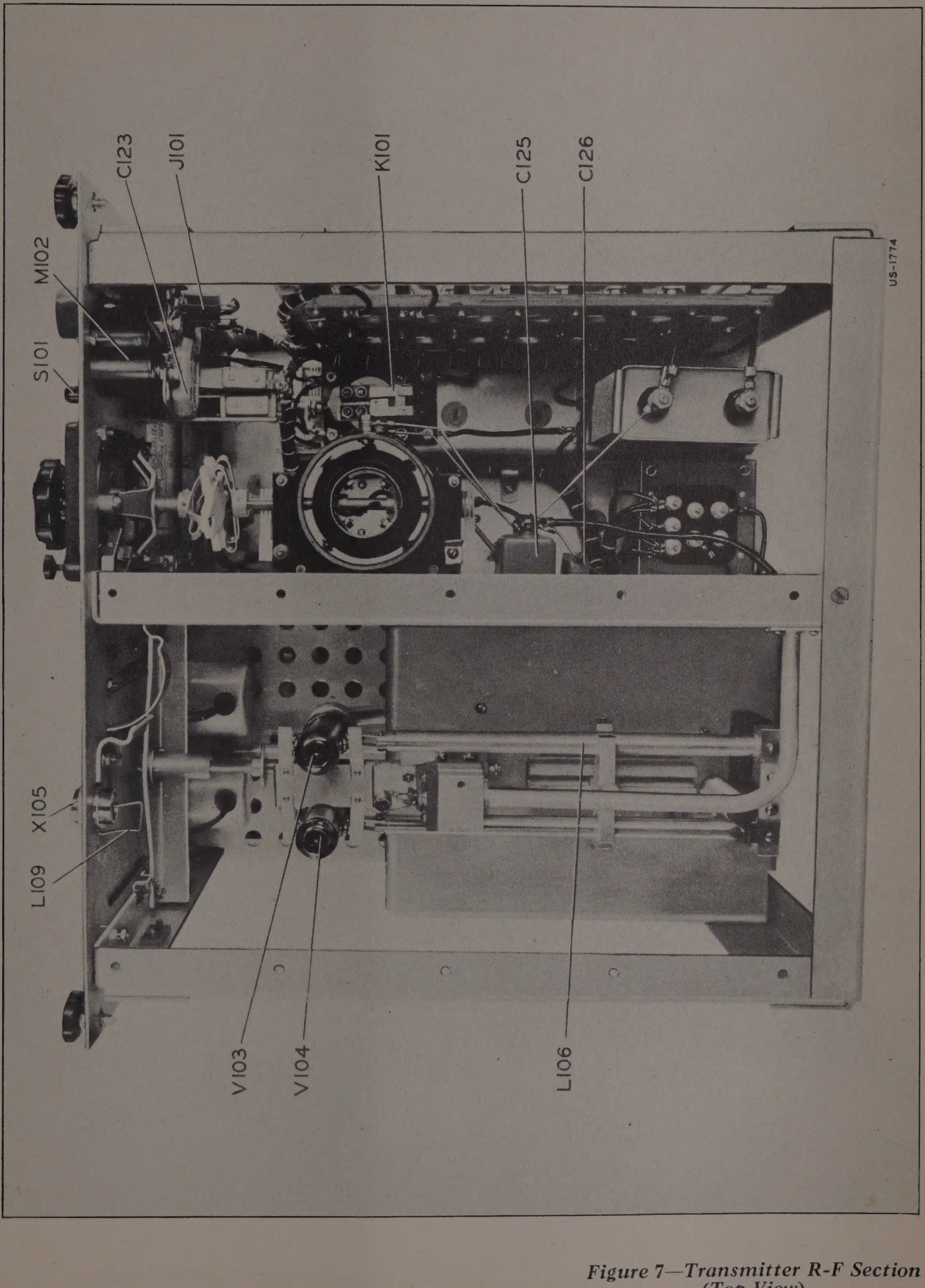

C123
J101
K101
C125
C126
M102
S101
X105
L109
V103
V104
L106
US-1774

Figure 7—Transmitter R-F Section (Top View)

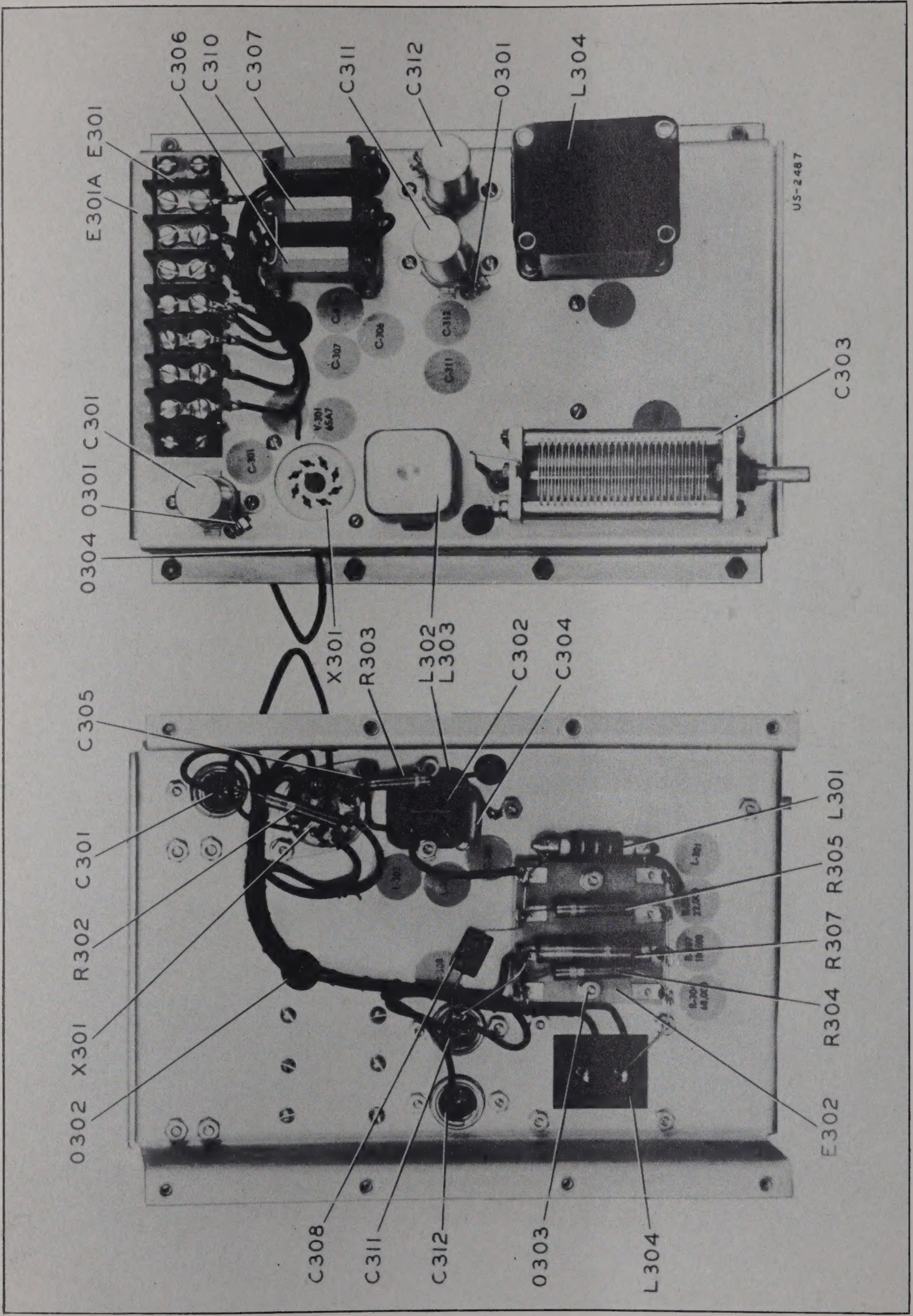

E301A
E301
C306
C310
C307
C311
C312
O301
L304
US-2487
C303
C301
O301
O304
X301
R303
L302
L303
C302
C304
C305
C301
R302
X301
O302
L301
R305
R307
R304
E302
C308
C311
C312
O303
L304

Figure 8—Transmitter Monitor Chassis (Top and Bottom Views)

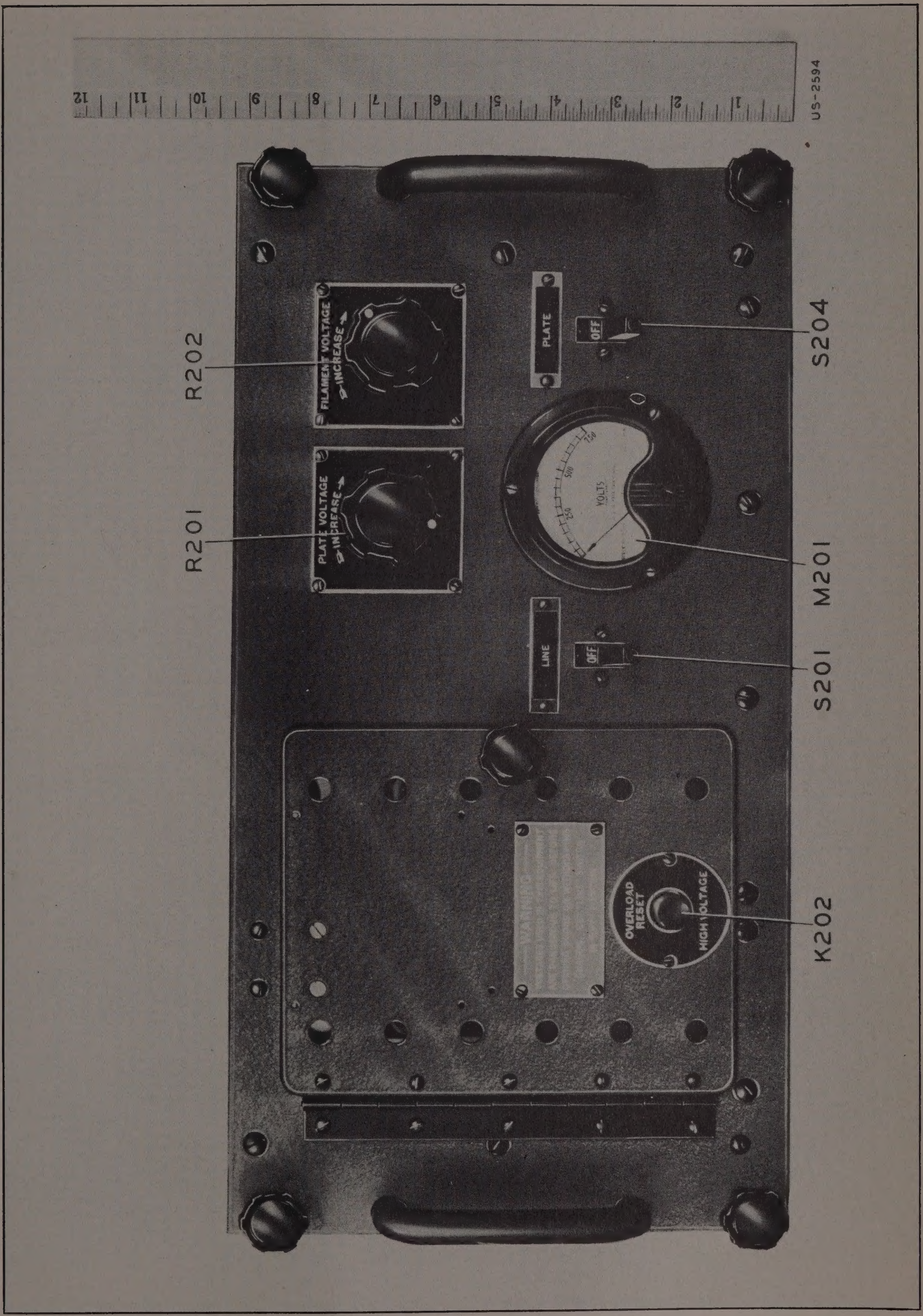

R202
R201
S204
M201
S201
K202
US-2594
FILAMENT VOLTAGE
INCREASE
PLATE VOLTAGE
INCREASE
PLATE
OFF
LINE
OFF
VOLTS
OVERLOAD RESET
HIGH VOLTAGE

Figure 9—Transmitter Power Supply (Front View)

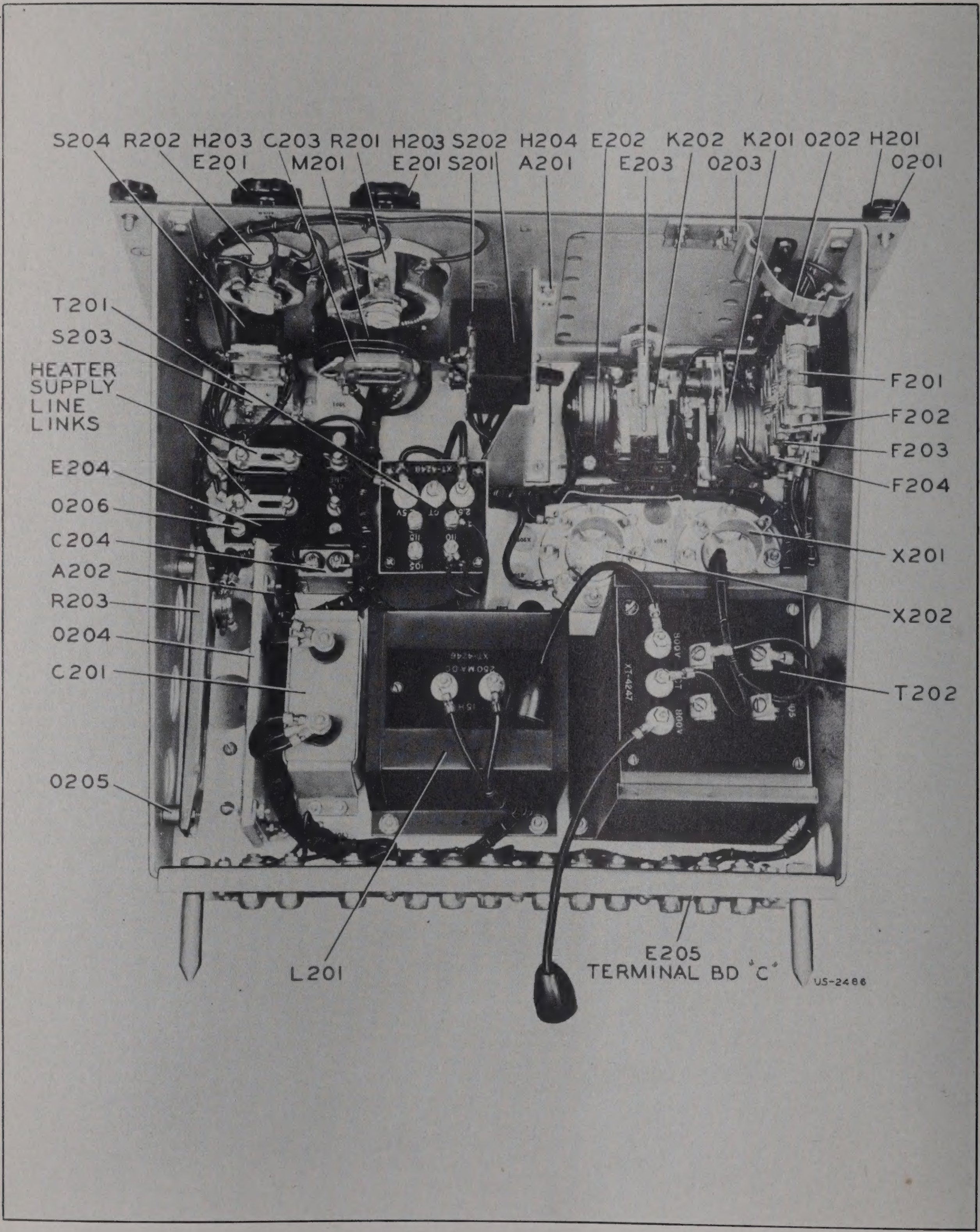

S204
R202
H203
E201
C203
M201
R201
H203
E201
S202
S201
H204
A201
E202
E203
K202
0203
K201
0202
H201
0201
T201
S203
HEATER SUPPLY LINE LINKS
E204
0206
C204
A202
R203
0204
C201
0205
F201
F202
F203
F204
X201
X202
T202
L201
E205
TERMINAL BD "C"
US-2486

Figure 10—Transmitter Power Supply (Rear View)

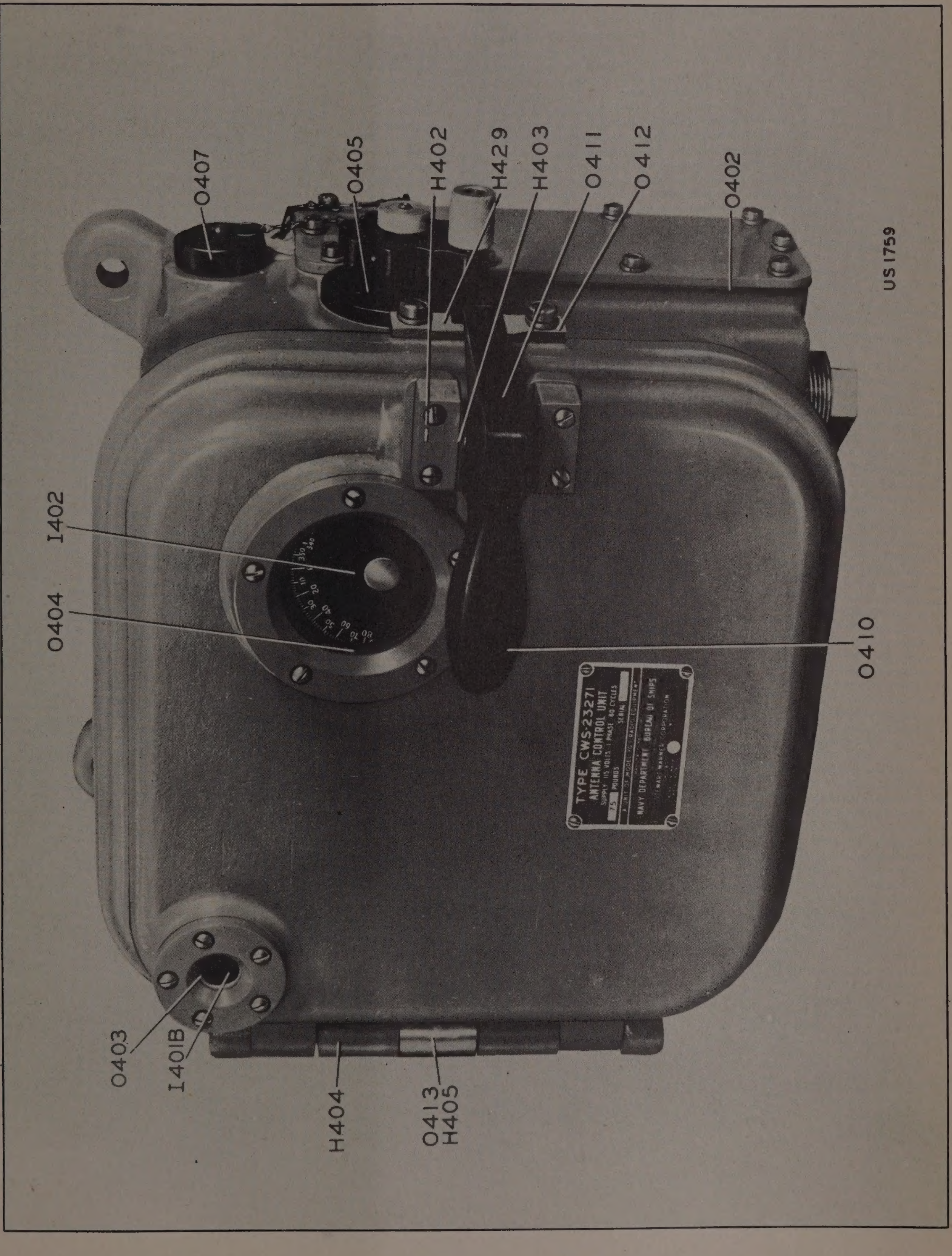

O407
O405
H402
H429
H403
O411
O412
O402
US1759
I402
O404
O410
TYPE CWS-23271
ANTENNA CONTROL UNIT
SUPPLY 115 VOLTS 1 PHASE 60 CYCLES
75 POUNDS
SERIAL
NAVY DEPARTMENT BUREAU OF SHIPS
STEWART WARNER CORPORATION
O403
I401B
H404
O413
H405

Figure 11—Antenna Control Unit (Front View)

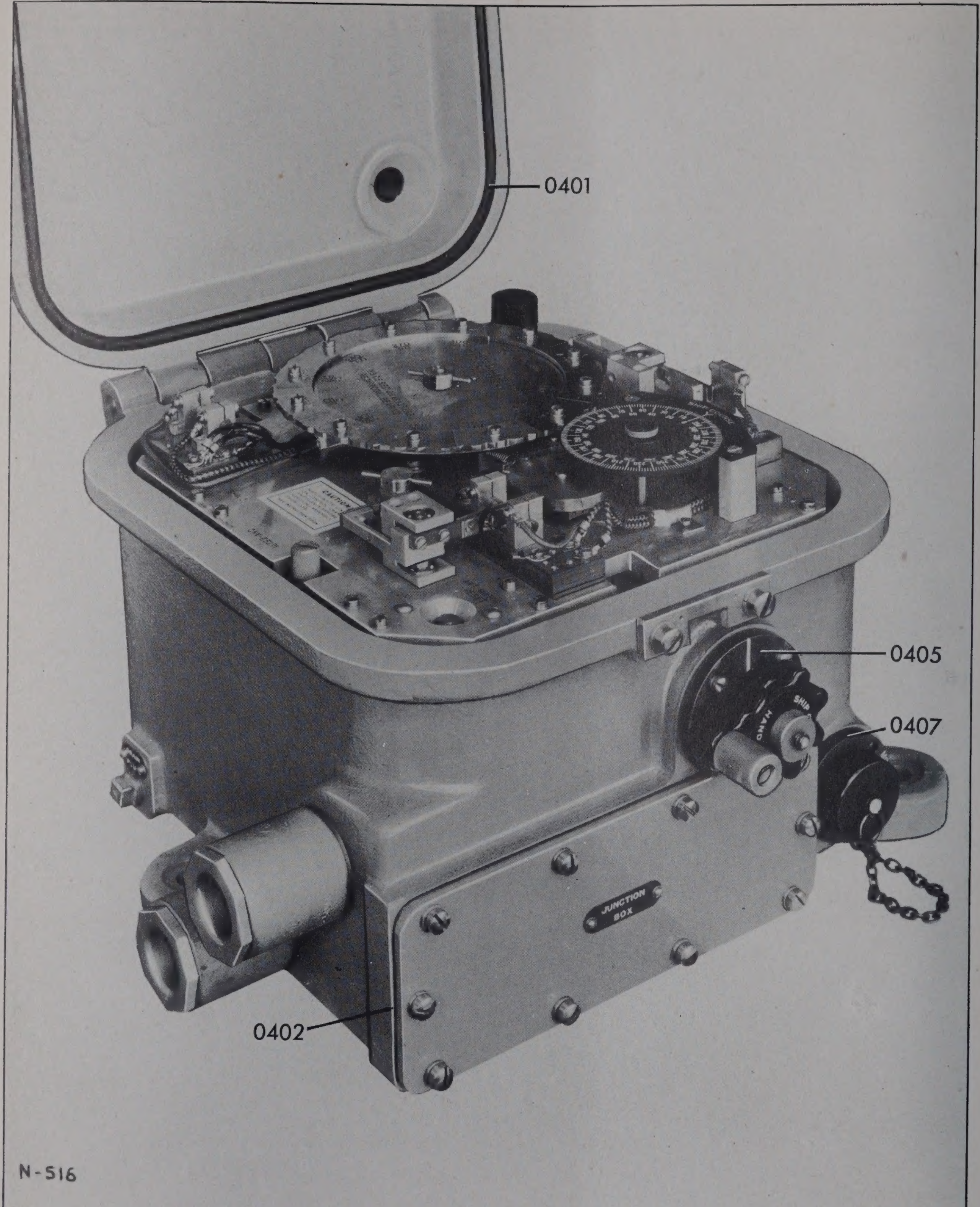

0401
0405
0407
0402
JUNCTION BOX
SHIP
HAND
CAUTION
N-516

Figure 12—Antenna Control Unit (Cover Open)

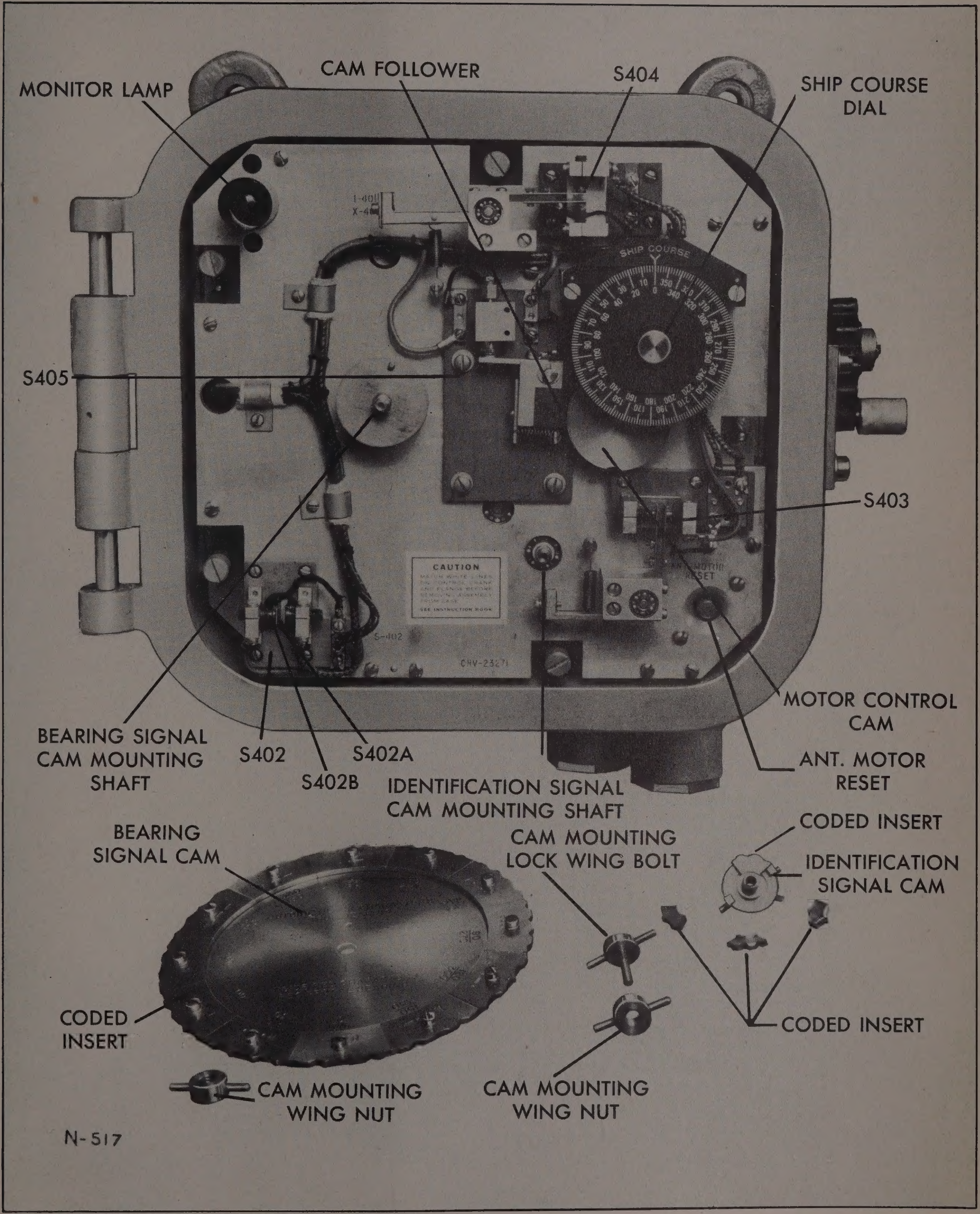

MONITOR LAMP
CAM FOLLOWER
S404
SHIP COURSE DIAL
SHIP COURSE
S405
S403
CAUTION
S-402
MOTOR CONTROL CAM
BEARING SIGNAL CAM MOUNTING SHAFT
S402
S402A
S402B
IDENTIFICATION SIGNAL CAM MOUNTING SHAFT
ANT. MOTOR RESET
BEARING SIGNAL CAM
CAM MOUNTING LOCK WING BOLT
CODED INSERT
IDENTIFICATION SIGNAL CAM
CODED INSERT
CODED INSERT
CAM MOUNTING WING NUT
CAM MOUNTING WING NUT
N-517

Figure 13—Antenna Control Unit (Cover Open, Cam Details)

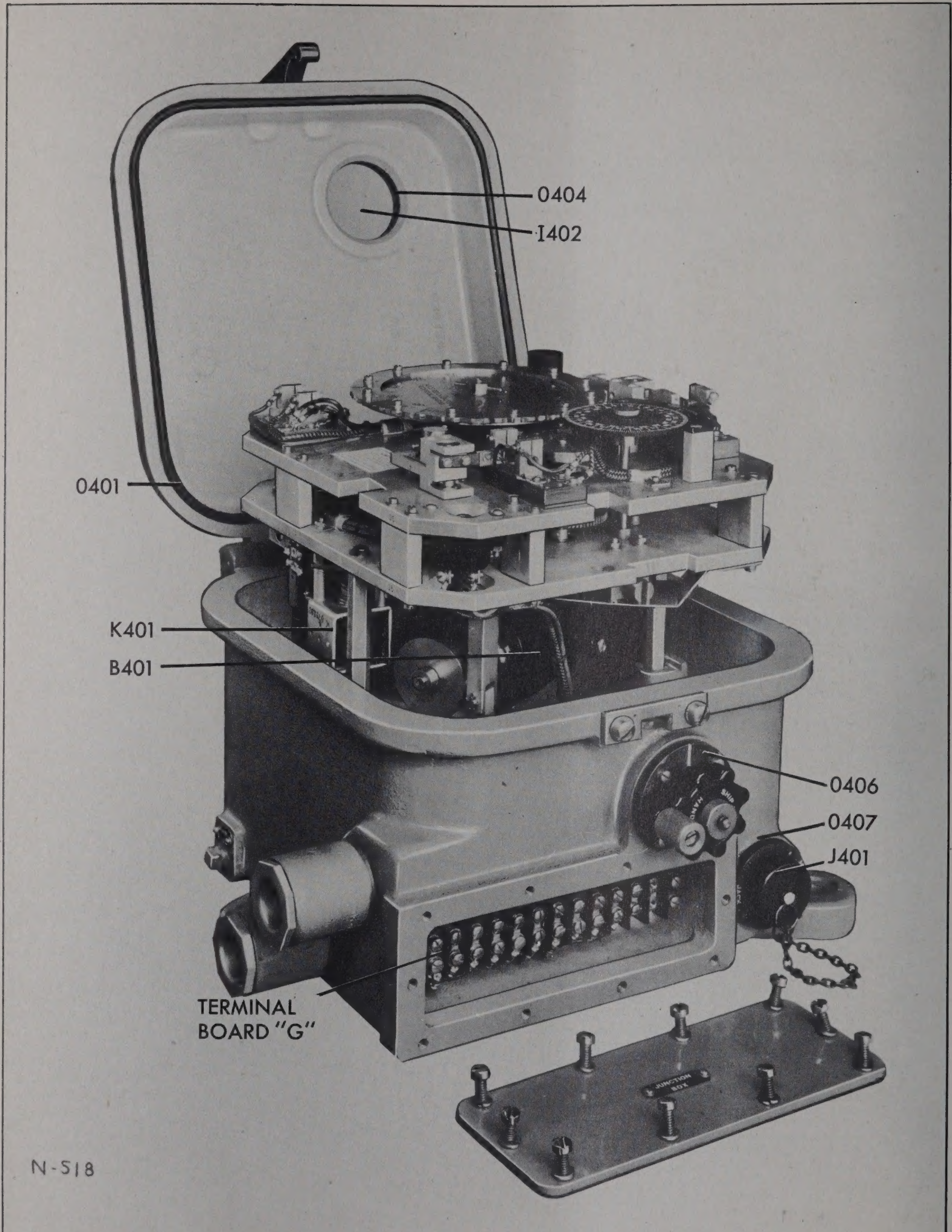

0404
I402
0401
K401
B401
0406
SHIP
HAND
0407
J401
JACK
TERMINAL BOARD "G"
JUNCTION BOX
N-518

Figure 14—Antenna Control Unit (Chassis Raised)

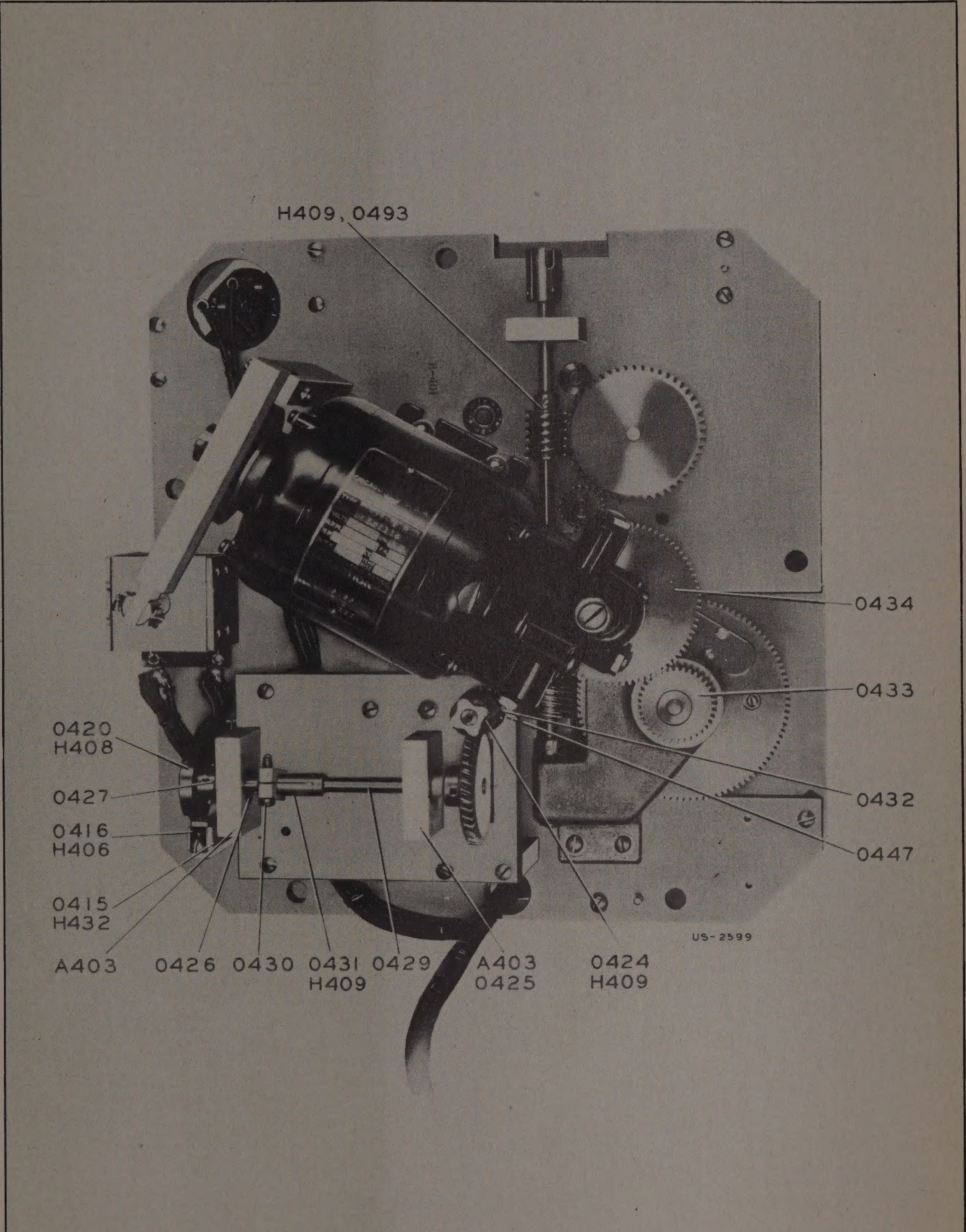

H409, 0493
0434
0433
0432
0447
0420
H408
0427
0416
H406
0415
H432
A403
0426
0430
0431
H409
0429
A403
0425
0424
H409
US-2599

Figure 15—Antenna Control Unit (Chassis Bottom View)

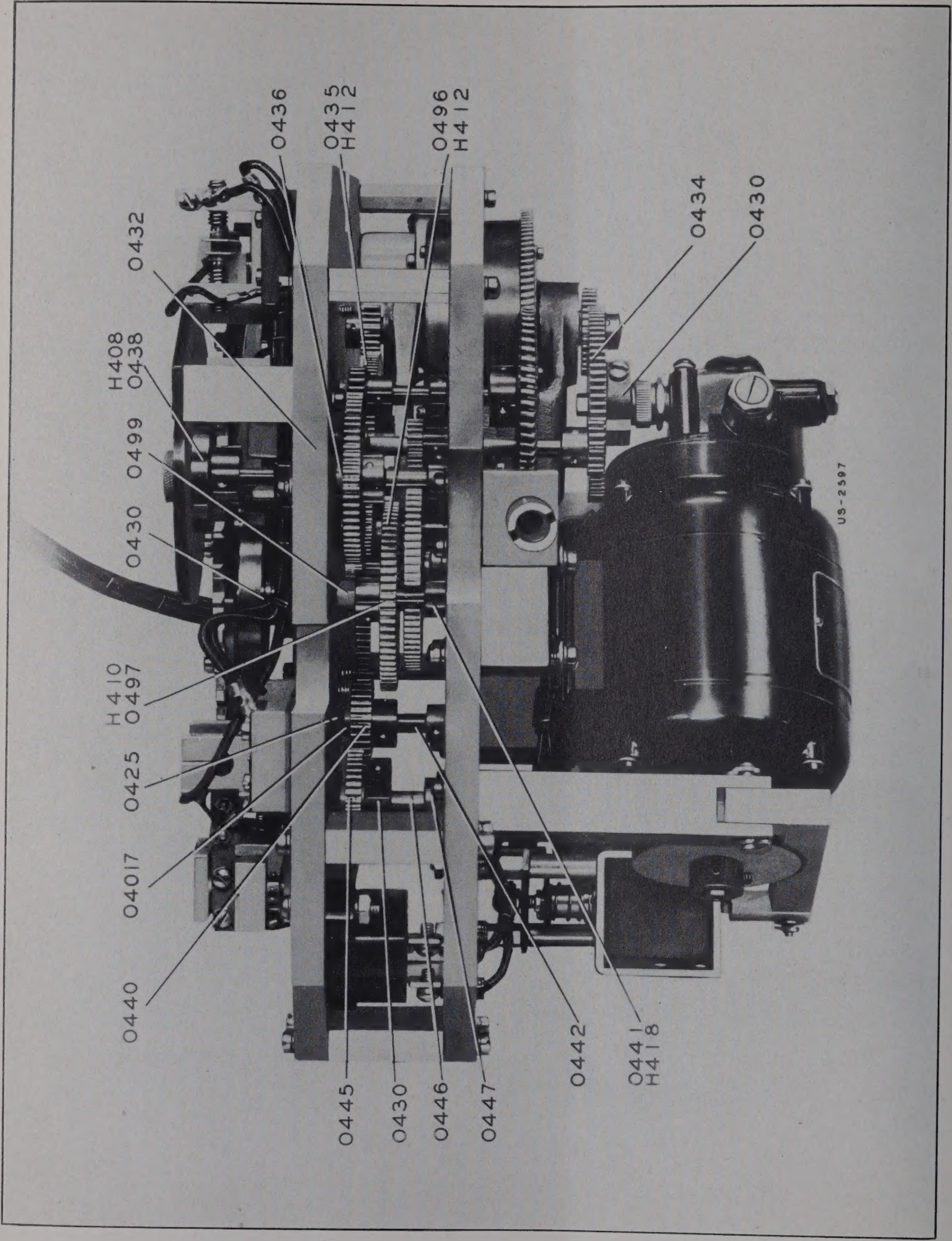

0436
0435
H412
0496
H412
0434
0430
0432
H408
0438
0499
0430
H410
0497
0425
04017
0440
0445
0430
0446
0447
0442
0441
H418
US-2597

Figure 16—Antenna Control Unit (Chassis, Right Hand, Side View)

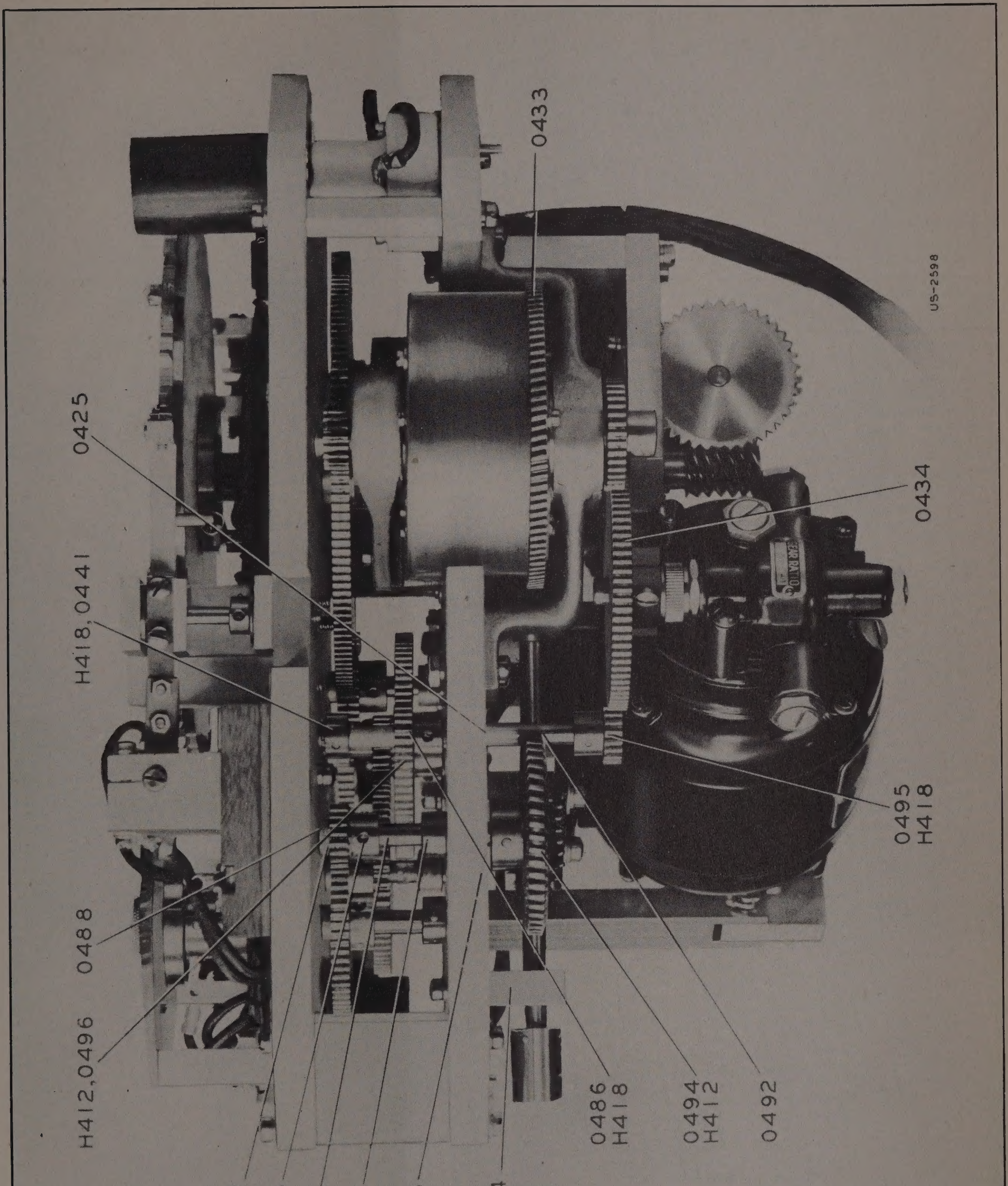

0433
0425
H418,0441
0434
US-2598
0495
H418
0488
H412,0496
0437
0485
0491
0495
0488
A404
0486
H418
0494
H412
0492

Figure 17—Antenna Control Unit (Chassis, Left Hand, Side View)

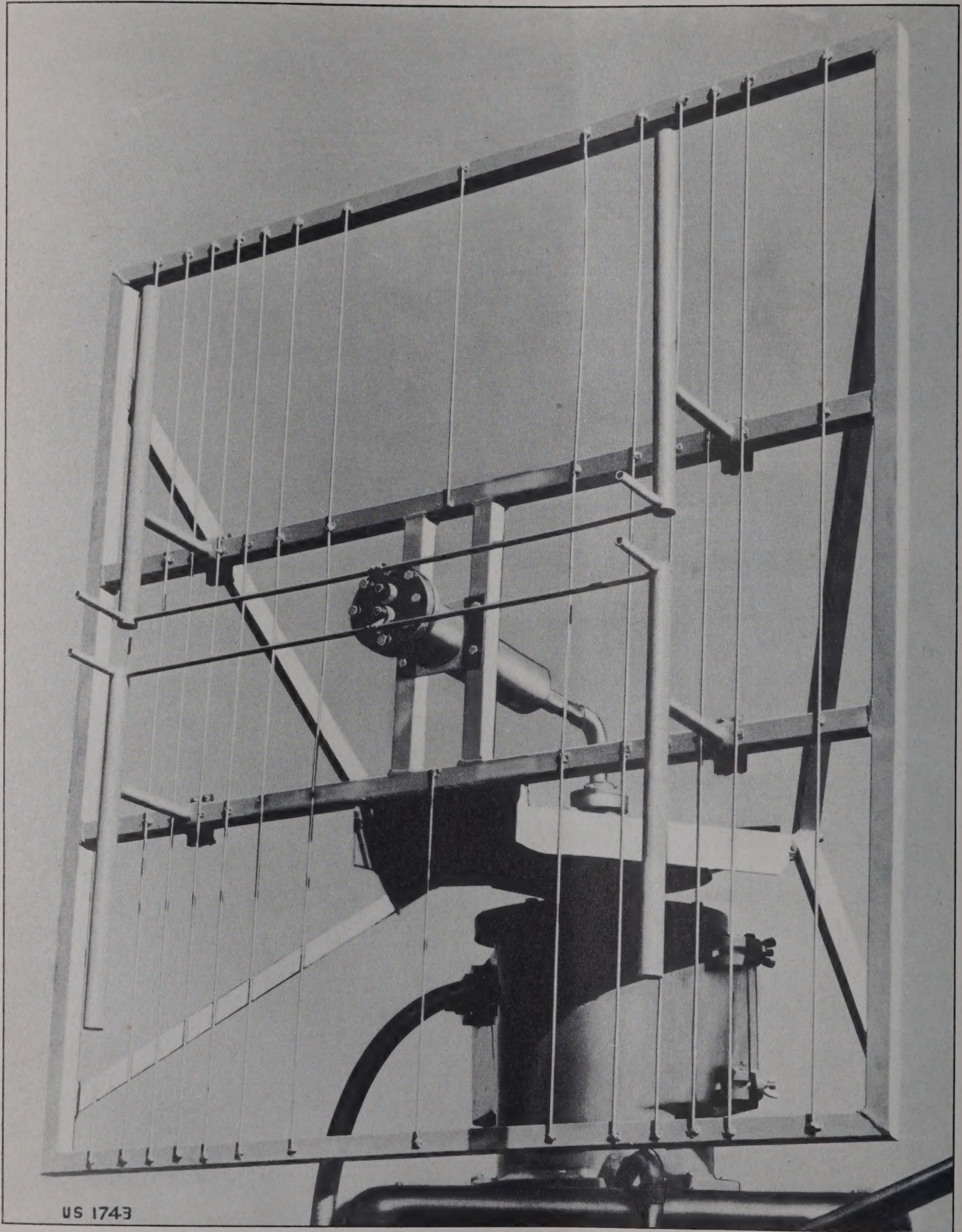


Figure 18—Antenna Assembly (Front View)

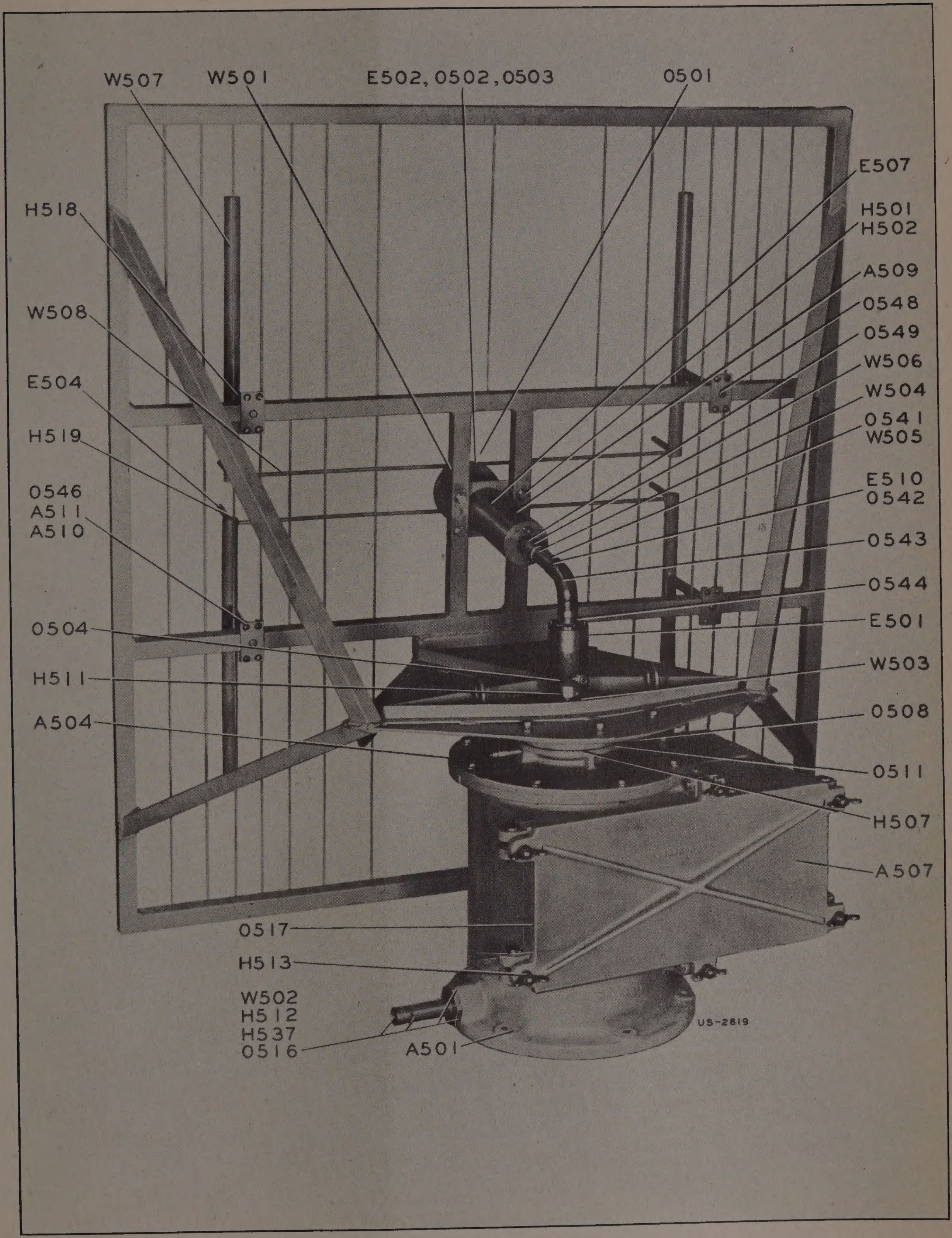

W507
W501
E502, 0502, 0503
0501
E507
H518
H501
H502
A509
W508
0548
0549
W506
E504
W504
H519
0541
W505
0546
A511
A510
E510
0542
0543
0544
0504
E501
H511
W503
A504
0508
0511
H507
A507
0517
H513
W502
H512
H537
0516
A501
US-2619

Figure 19—Antenna Assembly Pedestal (Rear View)

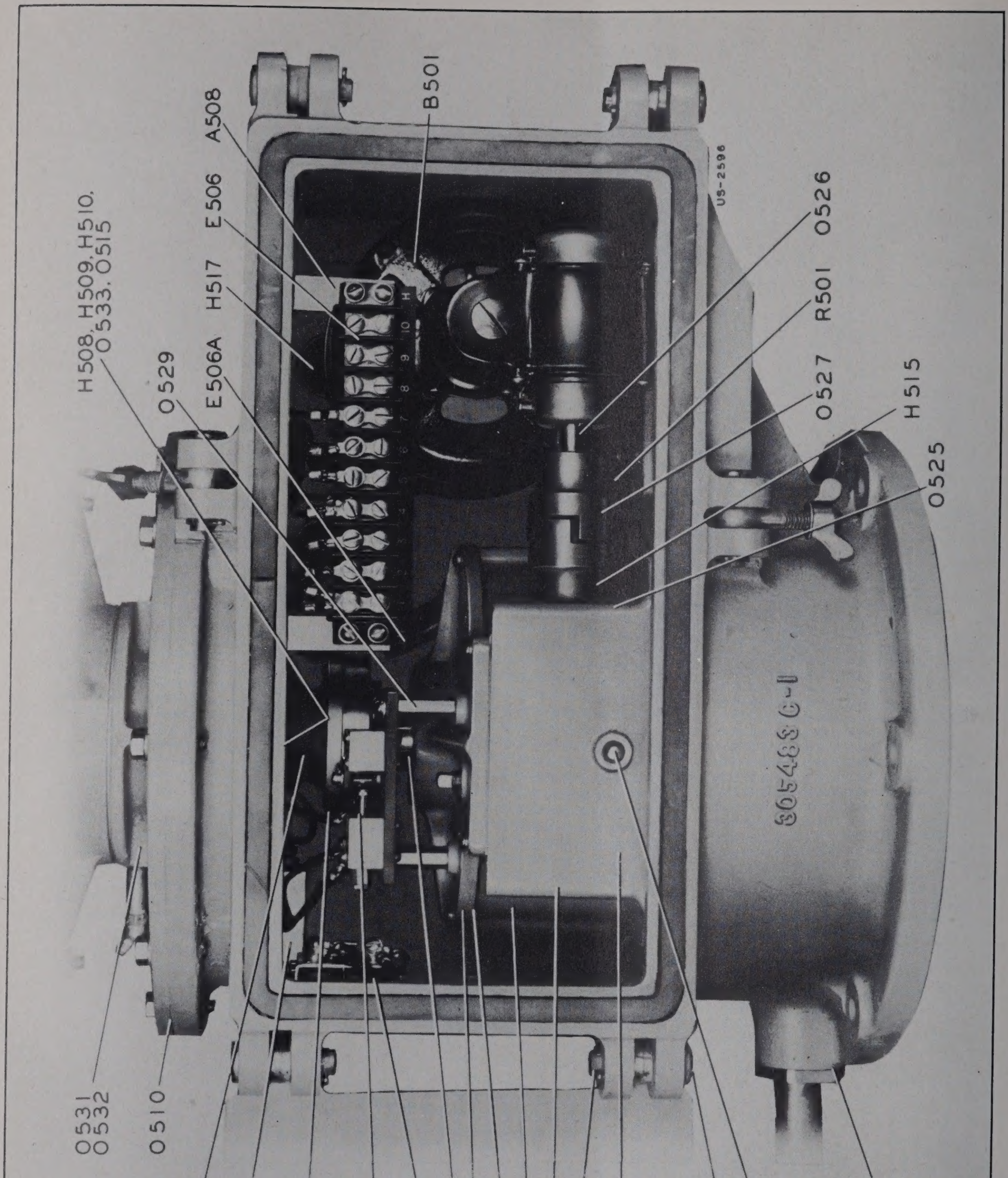

H508, H509, H510,
O533, O515
O529
E506A
H517
E506
A508
B501
US-2596
O526
R501
O527
H515
O525
305488 C-1
O531
O532
O510
A506
O538
C501
O530
S501
S502
S503
O505
A503
O528
A502
H505
H504
O520
O519
H514
H516
O534

Figure 20—Antenna Assembly, Pedestal (View of Interior)

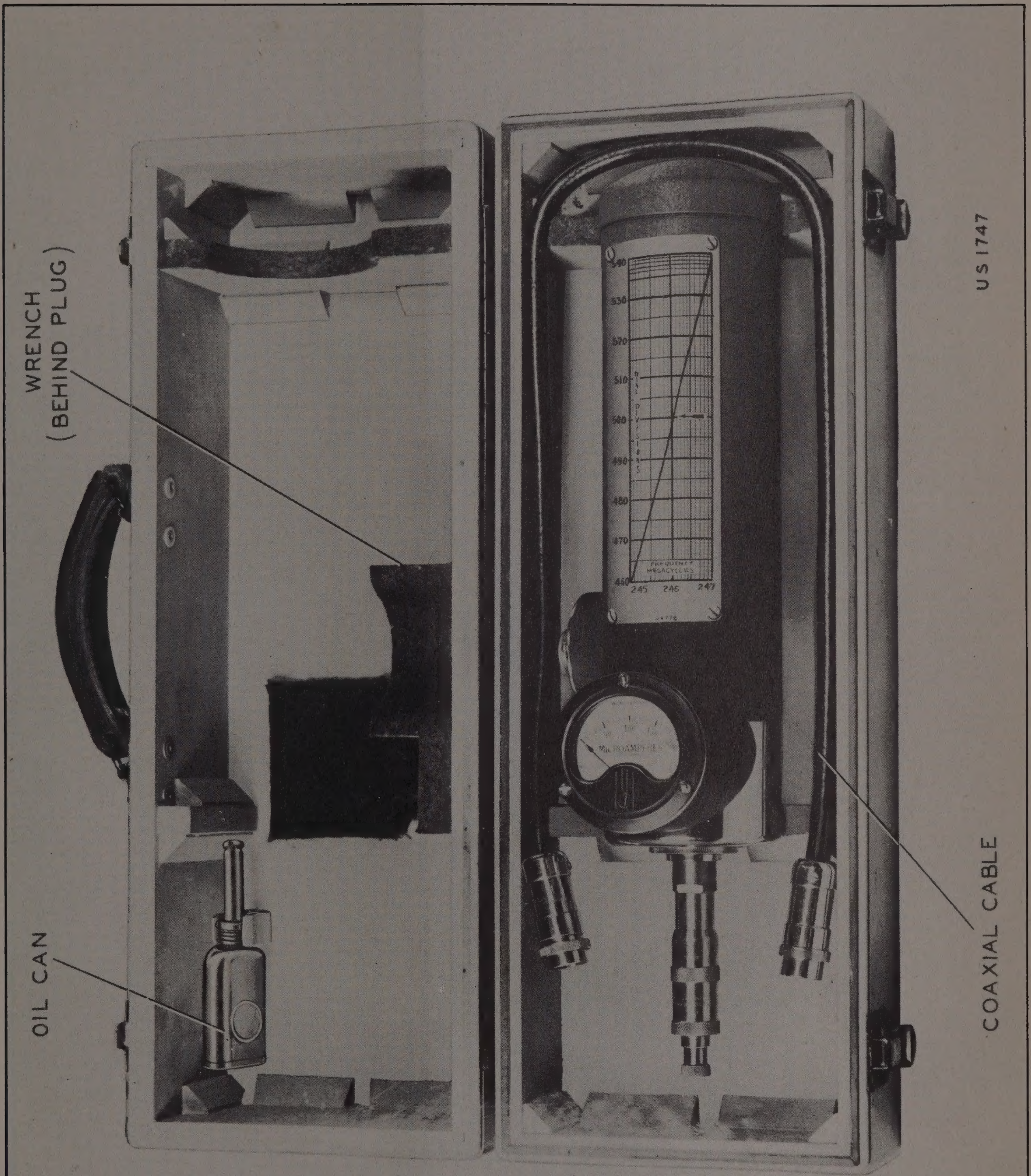

WRENCH
(BEHIND PLUG)
OIL CAN
COAXIAL CABLE
US 1747
540
530
520
510
500
490
480
470
460
245
246
247
FREQUENCY
MEGACYCLES
DIAL DIVISIONS
MICROAMPERES

Figure 21—Frequency Meter (In Storage Case)

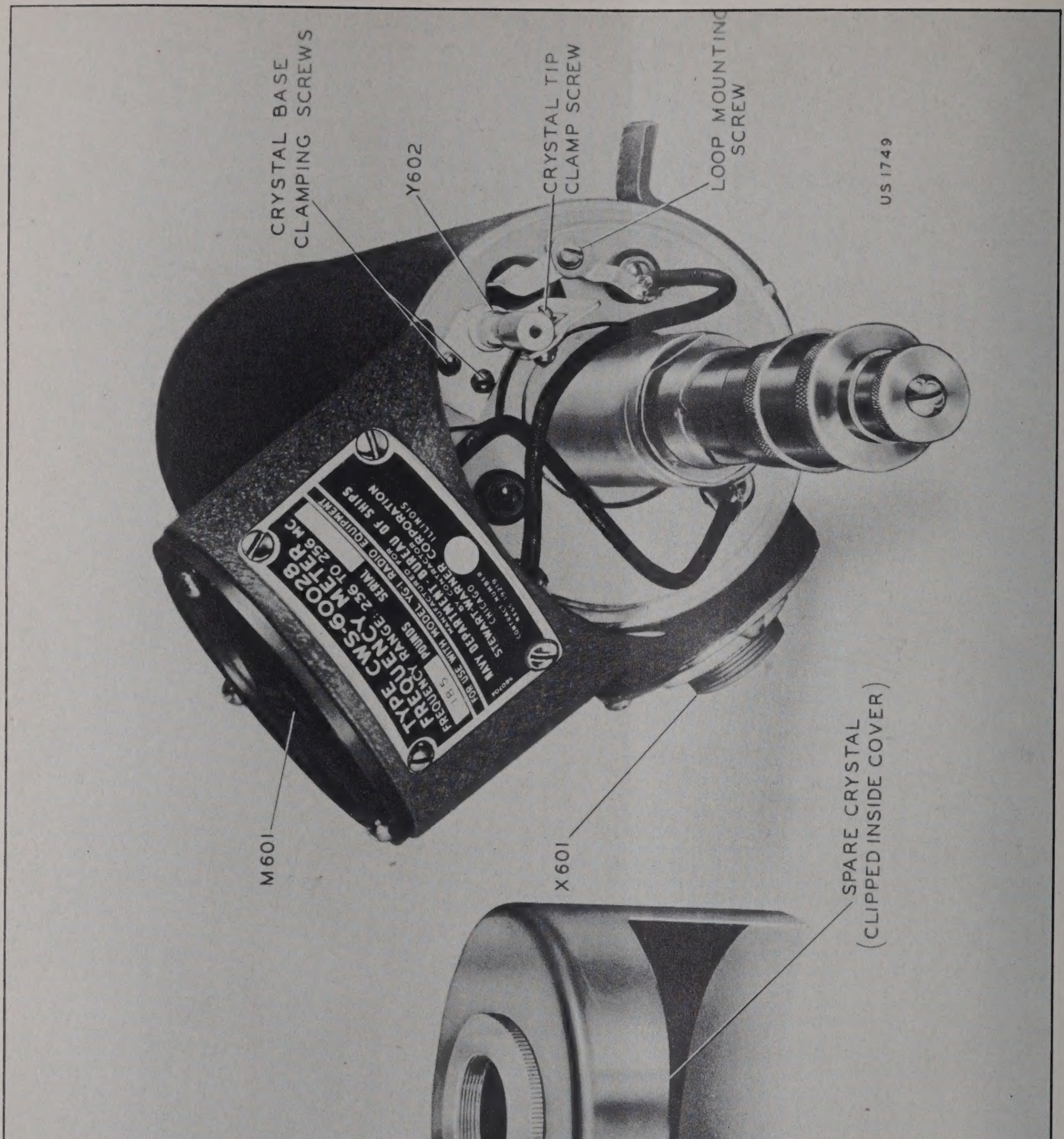

CRYSTAL BASE CLAMPING SCREWS
Y602
CRYSTAL TIP CLAMP SCREW
LOOP MOUNTING SCREW
US 1749
M601
X601
SPARE CRYSTAL (CLIPPED INSIDE COVER)
TYPE CWS-6002B
FREQUENCY METER
FREQUENCY RANGE: 236 TO 256 MC
NAVY DEPARTMENT - BUREAU OF SHIPS
STEWART-WARNER CORPORATION
CHICAGO ILLINOIS

Figure 22A—Frequency Meter (Front View, Cover Removed)

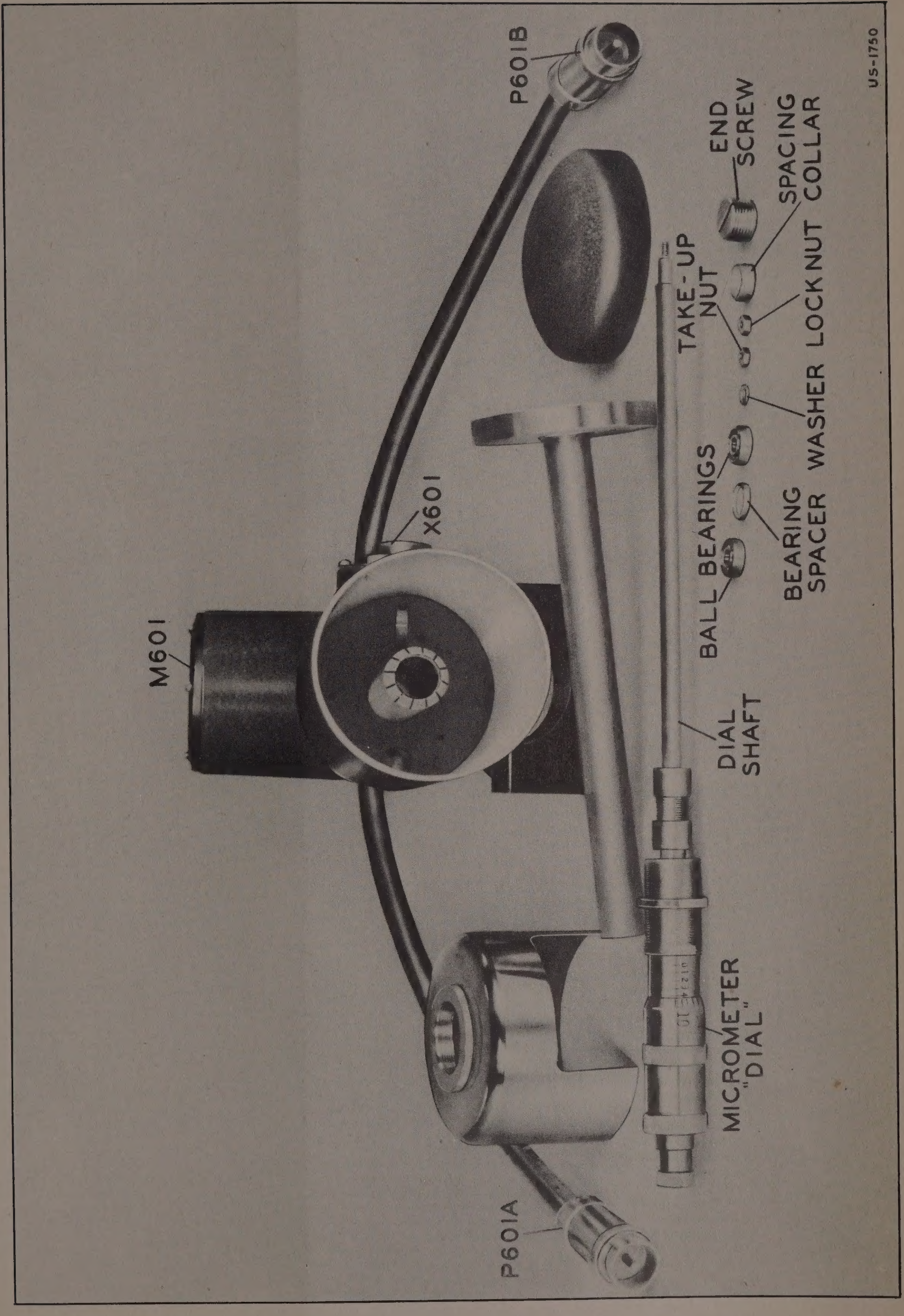

P601A
M601
X601
P601B
MICROMETER "DIAL"
DIAL SHAFT
BALL BEARINGS
BEARING SPACER
WASHER
TAKE-UP NUT
LOCKNUT
SPACING COLLAR
END SCREW
US-1750

Figure 22B—Frequency Meter (Disassembled)

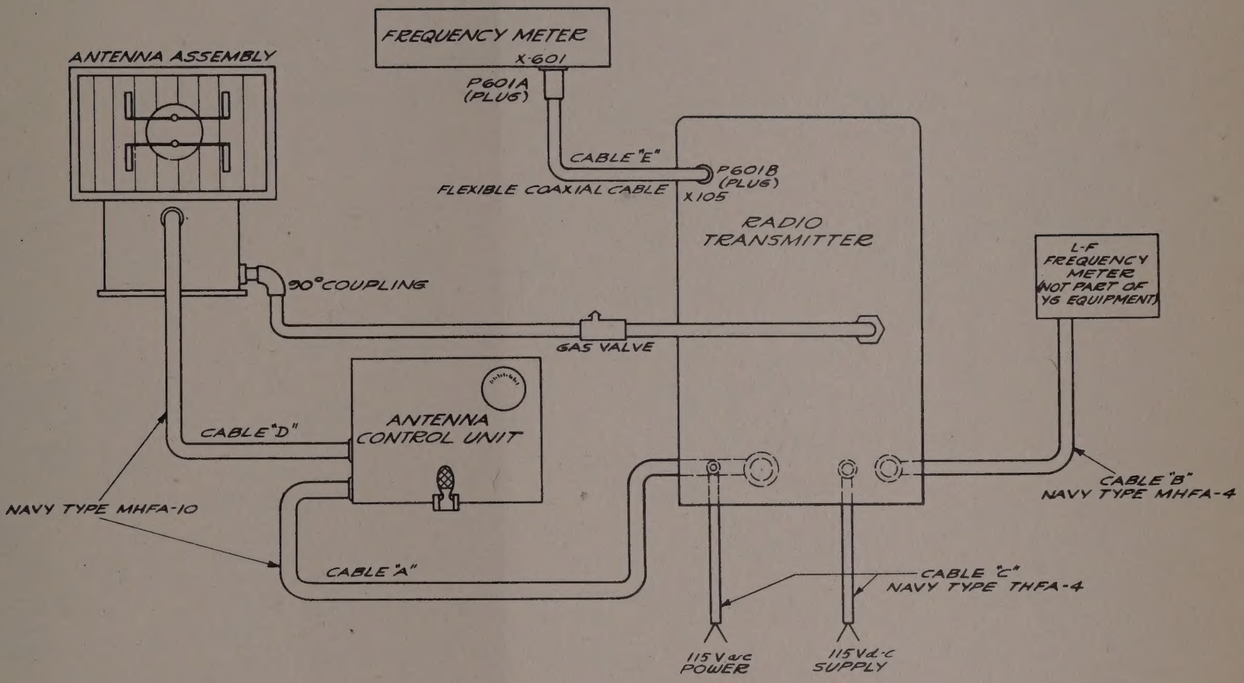

FREQUENCY METER
X-601
P601A (PLUG)
ANTENNA ASSEMBLY
CABLE "E"
P601B (PLUG)
FLEXIBLE COAXIAL CABLE
X105
RADIO TRANSMITTER
L-F FREQUENCY METER (NOT PART OF YG EQUIPMENT)
90° COUPLING
GAS VALVE
ANTENNA CONTROL UNIT
CABLE "D"
NAVY TYPE MHFA-10
CABLE "B" NAVY TYPE MHFA-4
CABLE "A"
CABLE "C" NAVY TYPE THFA-4
115 V a-c POWER
115 V d-c SUPPLY

TABLE OF REFERENCES					
OVERALL SCHEMATIC DIAGRAM, FIGURE 24					
FUNCTIONAL BLOCK DIAGRAM, FIGURE 40					
CABLE AND INTERCONNECTION DIAGRAM, FIGURE 39					
MAJOR UNIT	NAVY TYPE NO.	OUTLINE DWG.	SCHEMATIC DIAG.	WIRING DIAG.	SYMBOL NO. ASSIGNMENT
RADIO TRANSMITTER	CWS-52244	FIGURE 35	FIGURE 24	FIGURES 29, 30, 31	101 - 399
ANTENNA CONTROL UNIT	CWS-23271	FIGURE 36	FIGURE 25	FIGURE 32	401 - 499
ANTENNA ASSEMBLY	CWS-66037	FIGURE 37	FIGURE 25	FIGURE 33	501 - 599
FREQUENCY METER	CWS-60028	FIGURE 38	FIGURE 28	FIGURE 34	601 - 699
LIST OF ELECTRICAL AND MECHANICAL PARTS BY SYMBOL DESIGNATION SEE TABLE II*					
LIST OF ELECTRICAL AND MECHANICAL PARTS BY NAVY TYPE NUMBERS SEE TABLE III*					
LIST OF SPARE PARTS SEE TABLE IV					
PHOTOGRAPHS OF MAJOR UNITS: REFER TO TABLE OF CONTENTS; SEE "ILLUSTRATIONS"					

CABLES A, B, C & D ARE NOT SUPPLIED WITH THIS EQUIPMENT.

* NOT AVAILABLE FOR PRELIMINARY BOOK, WILL BE INCLUDED IN FINAL

Figure 23—Model YG-1 Equipment Key Diagram (Major Units and Their Interconnections, P-721529)

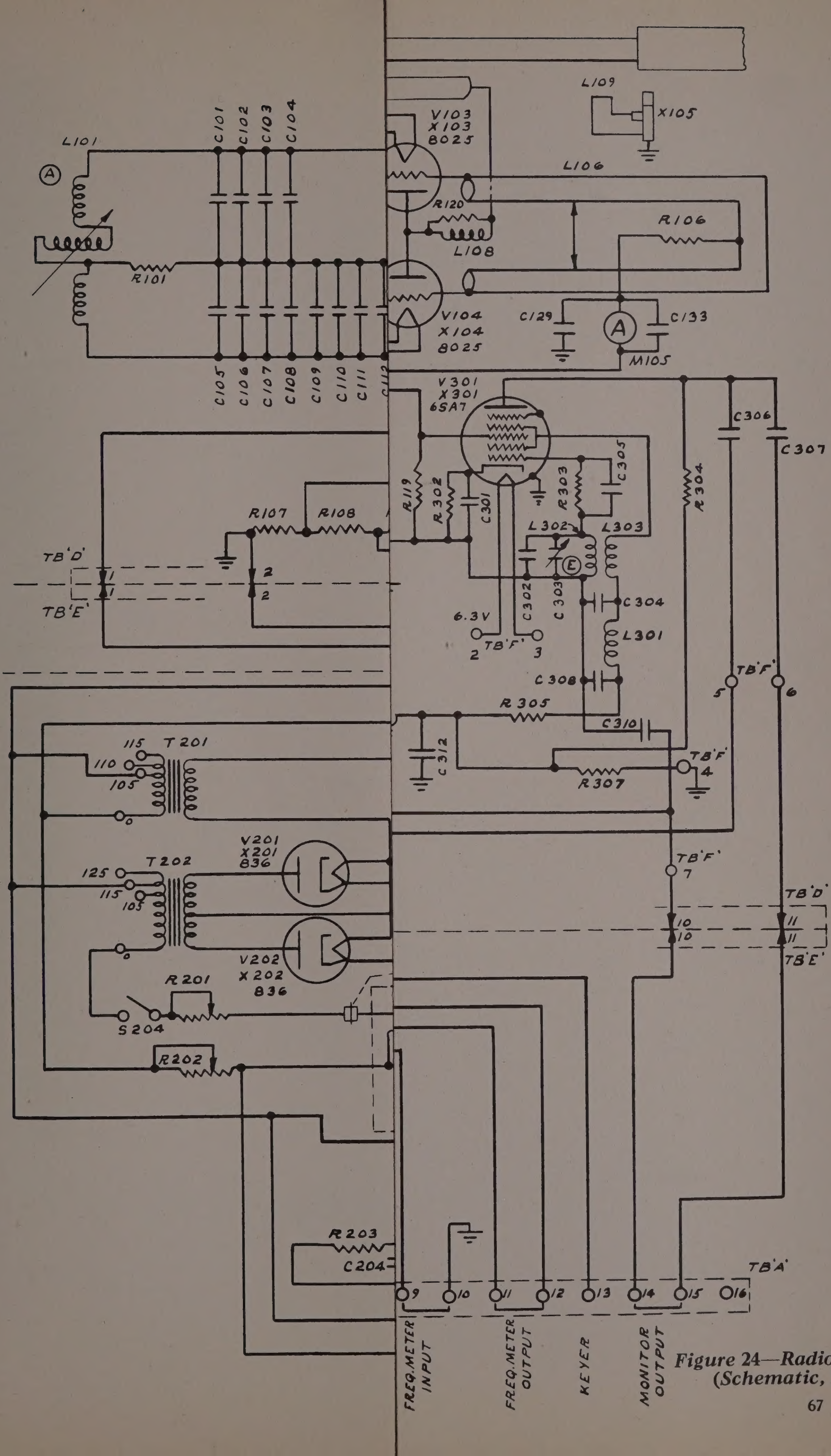

L109
X105
V103
X103
8025
C101
C102
C103
C104
L101
Ⓐ
L106
R120
R106
L108
R101
V104
X104
8025
C129
Ⓐ
C133
M105
C105
C106
C107
C108
C109
C110
C111
C112
V301
X301
6SA7
C306
C307
C305
R119
R302
C301
R303
R304
R107
R108
L302
L303
TB'D'
1
1
2
2
TB'E'
Ⓔ
C302
C303
C304
6.3V
L301
TB'F'
2
3
C308
TB'F'
5
6
R305
C310
C312
115
T201
110
105
0
TB'F'
4
R307
V201
X201
836
TB'F'
7
125
T202
115
105
0
TB'D'
10
10
11
11
TB'E'
V202
X202
836
R201
S204
R202
R203
C204
TB'A'
9
10
11
12
13
14
15
16
FREQ. METER INPUT
FREQ. METER OUTPUT
KEYER
MONITOR OUTPUT

Figure 24—Radio Transmitter
(Schematic, P-721203)

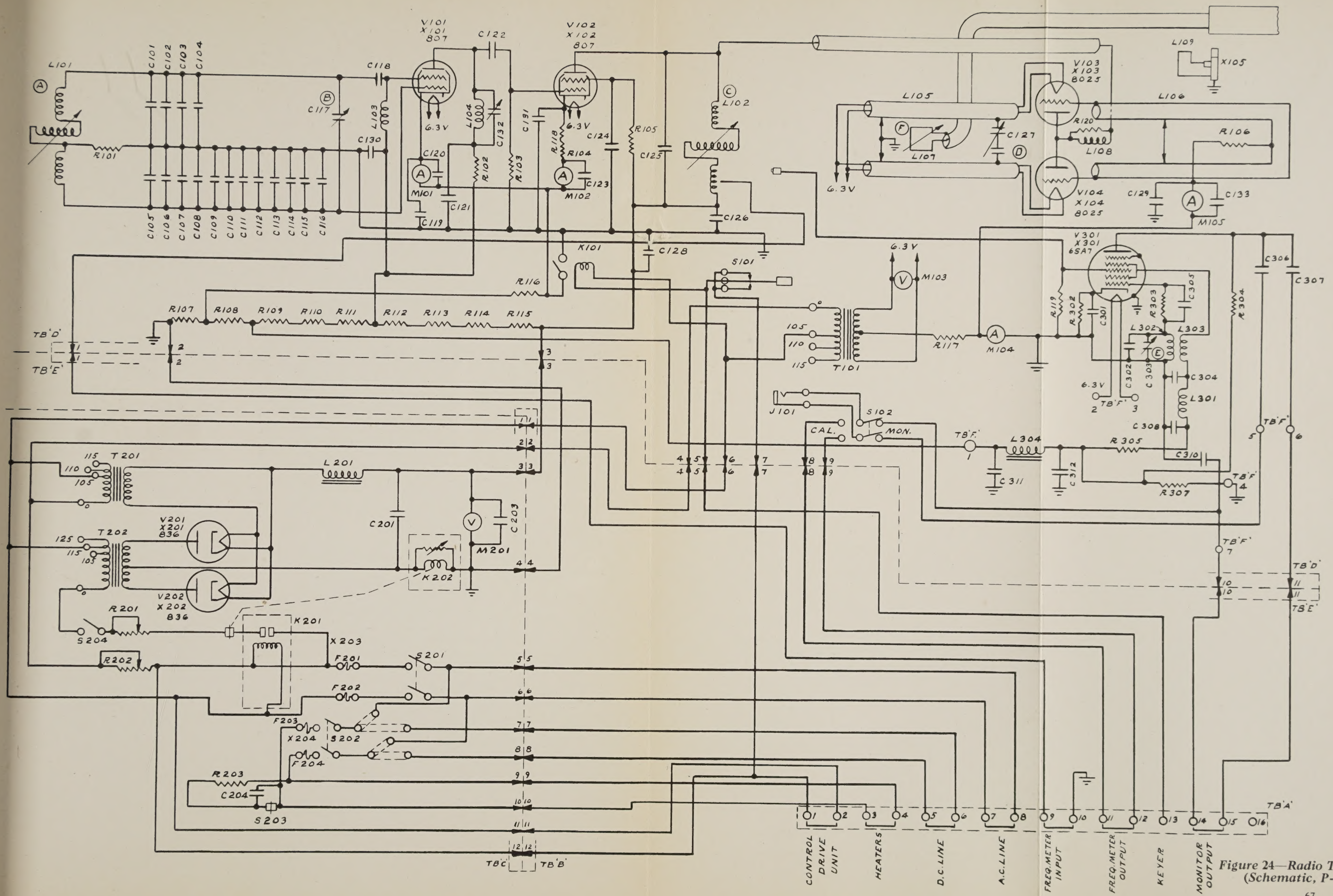
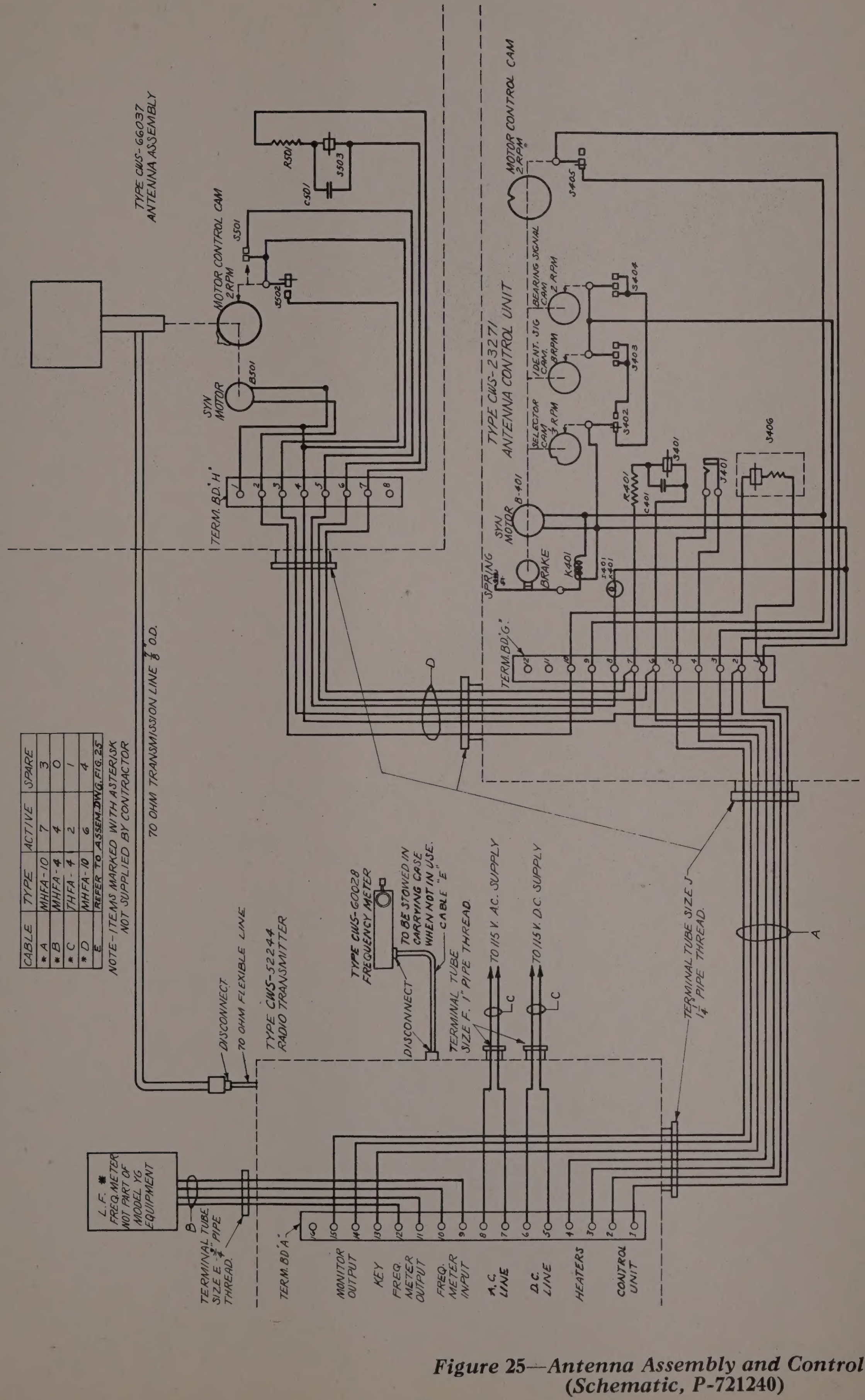

V101
X101
807
V102
X102
807
C122
C118
L101
A
B
C117
C101
C102
C103
C104
C105
C106
C107
C108
C109
C110
C111
C112
C113
C114
C115
C116
R101
L103
C130
6.3V
C120
M101
C119
C121
L104
C132
C131
R102
R103
R118
R104
M102
C123
C124
R105
C125
C
L102
C126
C128
K101
R116
S101
L105
L106
L107
L108
L109
X105
V103
X103
8025
V104
X104
8025
R120
R106
C127
D
F
C129
C133
M105
6.3V
V301
X301
6SA7
C306
C307
V
M103
R107
R108
R109
R110
R111
R112
R113
R114
R115
TB'D'
TB'E'
105
110
115
T101
R117
A
M104
R119
R302
C301
R303
C305
R304
L302
L303
C302
C303
E
C304
L301
6.3V
TB'F'
C308
J101
S102
CAL.
MON.
L304
R305
C310
C311
C312
R307
T201
115
110
105
L201
C201
C203
M201
T202
125
115
105
V201
X201
836
V202
X202
836
K202
R201
S204
K201
X203
F201
S201
R202
F202
F203
X204
S202
F204
R203
C204
S203
TB'C'
TB'B'
TB'A'
CONTROL DRIVE UNIT
HEATERS
D.C. LINE
A.C. LINE
FREQ. METER INPUT
FREQ. METER OUTPUT
KEYER
MONITOR OUTPUT

Figure 24—Radio Transmitter (Schematic, P-721203)


TYPE CWS-66037
ANTENNA ASSEMBLY
MOTOR CONTROL CAM
2RPM
SYN MOTOR
B501
S501
S502
S503
R501
C501
TERM. BD. 'H'
TYPE CWS-23271
ANTENNA CONTROL UNIT
MOTOR CONTROL CAM
2RPM
S405
BEARING SIGNAL CAM
2 RPM
S404
IDENT. SIG CAM.
8RPM
S403
SELECTOR CAM
3 RPM
S402
S401
J401
S406
R401
C401
SYN MOTOR
B-401
BRAKE
SPRING
K401
I401
X401
TERM. BD. 'G'
D
A
70 OHM TRANSMISSION LINE 7/8" O.D.
TYPE CWS-52244
RADIO TRANSMITTER
DISCONNECT
70 OHM FLEXIBLE LINE
TYPE CWS-60028
FREQUENCY METER
TO BE STOWED IN CARRYING CASE WHEN NOT IN USE.
CABLE "E"
TERMINAL TUBE SIZE F. 1" PIPE THREAD.
TO 115 V. AC. SUPPLY
TO 115 V. D.C. SUPPLY
C
TERMINAL TUBE SIZE J-1 1/4" PIPE THREAD.
L.F. * FREQ. METER NOT PART OF MODEL YG EQUIPMENT
B
TERMINAL TUBE SIZE E. 3/4" PIPE THREAD.
TERM. BD. 'A'
MONITOR OUTPUT
KEY
FREQ. METER OUTPUT
FREQ. METER INPUT
A.C. LINE
D.C. LINE
HEATERS
CONTROL UNIT

CABLE	TYPE	ACTIVE	SPARE
* A	MHFA-10	7	3
* B	MHFA-4	4	0
* C	THFA-4	2	1
* D	MHFA-10	6	4
E	REFER TO ASSEM. DWG. FIG. 25		

NOTE - ITEMS MARKED WITH ASTERISK NOT SUPPLIED BY CONTRACTOR

Figure 25—Antenna Assembly and Control Unit (Schematic, P-721240)

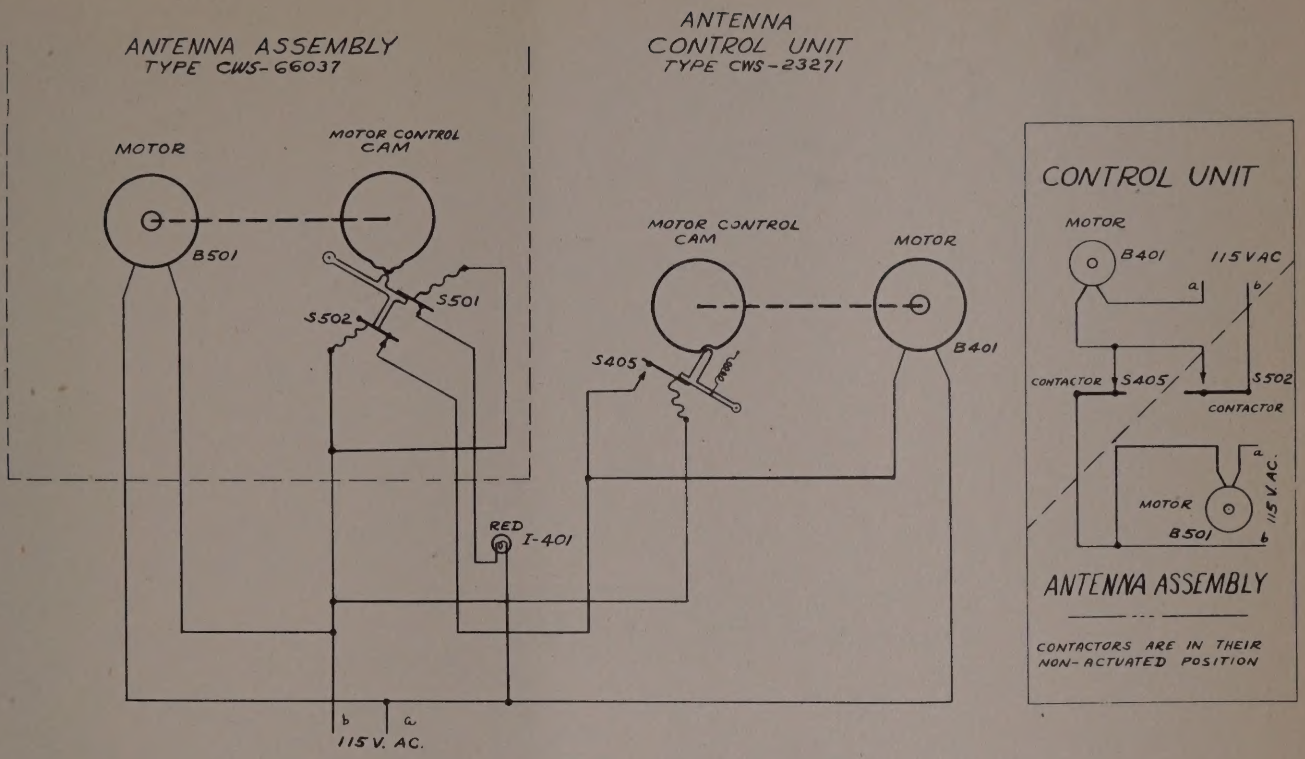

ANTENNA ASSEMBLY
TYPE CWS-66037
ANTENNA
CONTROL UNIT
TYPE CWS-23271
MOTOR
MOTOR CONTROL CAM
B501
S501
S502
MOTOR CONTROL CAM
MOTOR
B401
S405
RED
I-401
b
a
115 V. AC.
CONTROL UNIT
MOTOR
B401
115 VAC
a
b
CONTACTOR
S405
S502
CONTACTOR
a
MOTOR
B501
115 V. AC.
b
ANTENNA ASSEMBLY
CONTACTORS ARE IN THEIR NON-ACTUATED POSITION

Figure 26—Antenna Assembly and Control Unit Synchronizing Circuits (Schematic, M-422680)

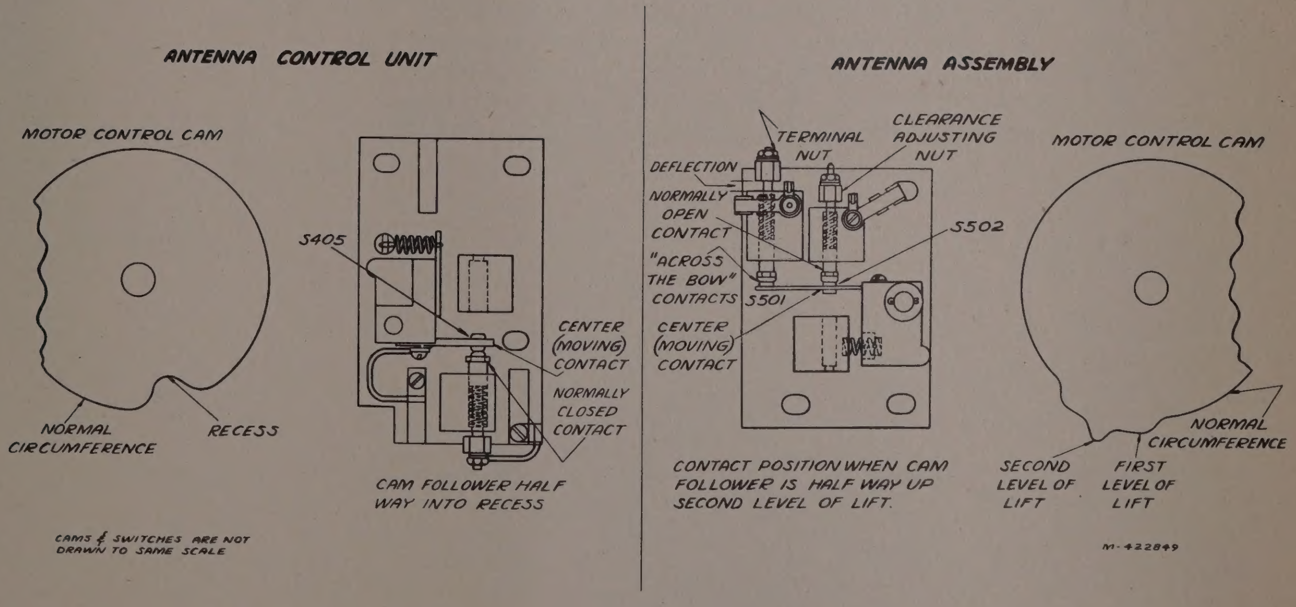
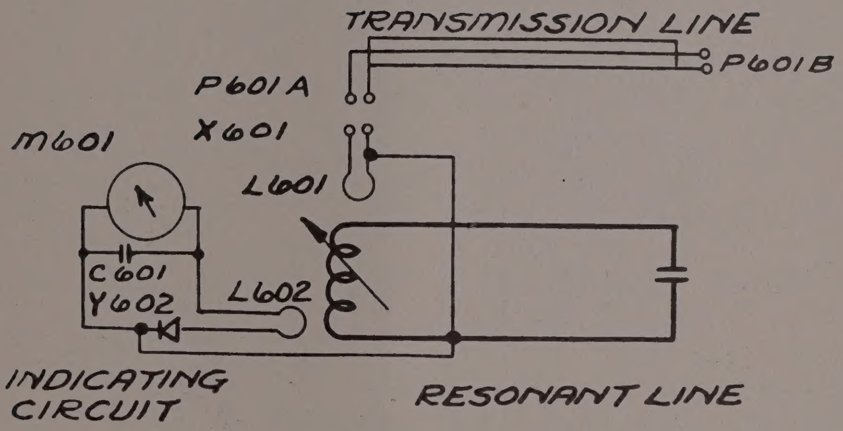
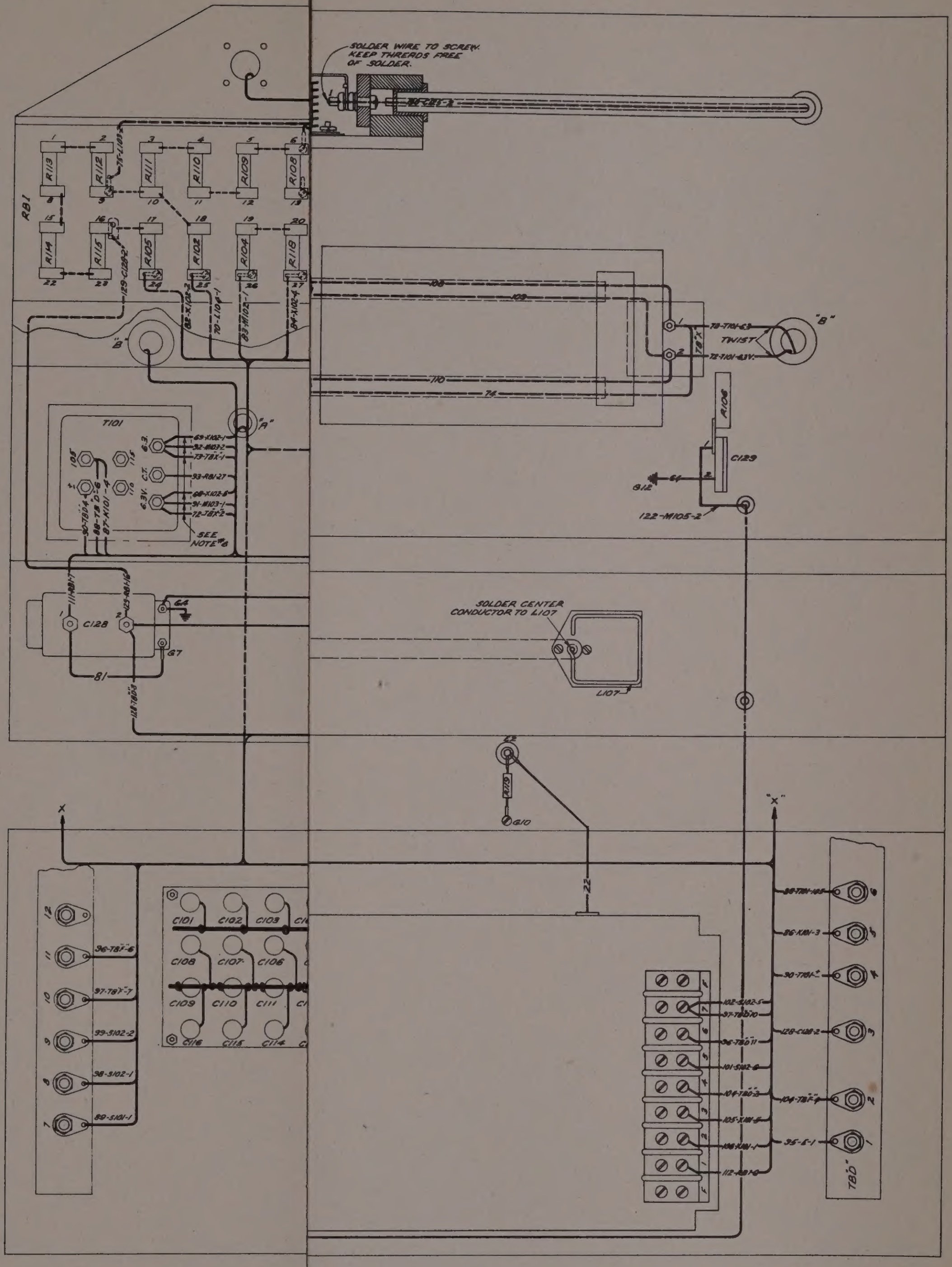

ANTENNA CONTROL UNIT
MOTOR CONTROL CAM
S405
CENTER (MOVING) CONTACT
NORMALLY CLOSED CONTACT
NORMAL CIRCUMFERENCE
RECESS
CAM FOLLOWER HALF WAY INTO RECESS
CAMS & SWITCHES ARE NOT DRAWN TO SAME SCALE
ANTENNA ASSEMBLY
TERMINAL NUT
CLEARANCE ADJUSTING NUT
DEFLECTION
NORMALLY OPEN CONTACT
"ACROSS THE BOW" CONTACTS
S501
CENTER (MOVING) CONTACT
S502
MOTOR CONTROL CAM
NORMAL CIRCUMFERENCE
SECOND LEVEL OF LIFT
FIRST LEVEL OF LIFT
CONTACT POSITION WHEN CAM FOLLOWER IS HALF WAY UP SECOND LEVEL OF LIFT.
M-422849

Figure 27—Antenna Assembly and Control Unit (Switches and Cams, M-422849)


TRANSMISSION LINE
P601B
P601A
X601
M601
L601
C601
Y602
L602
INDICATING CIRCUIT
RESONANT LINE

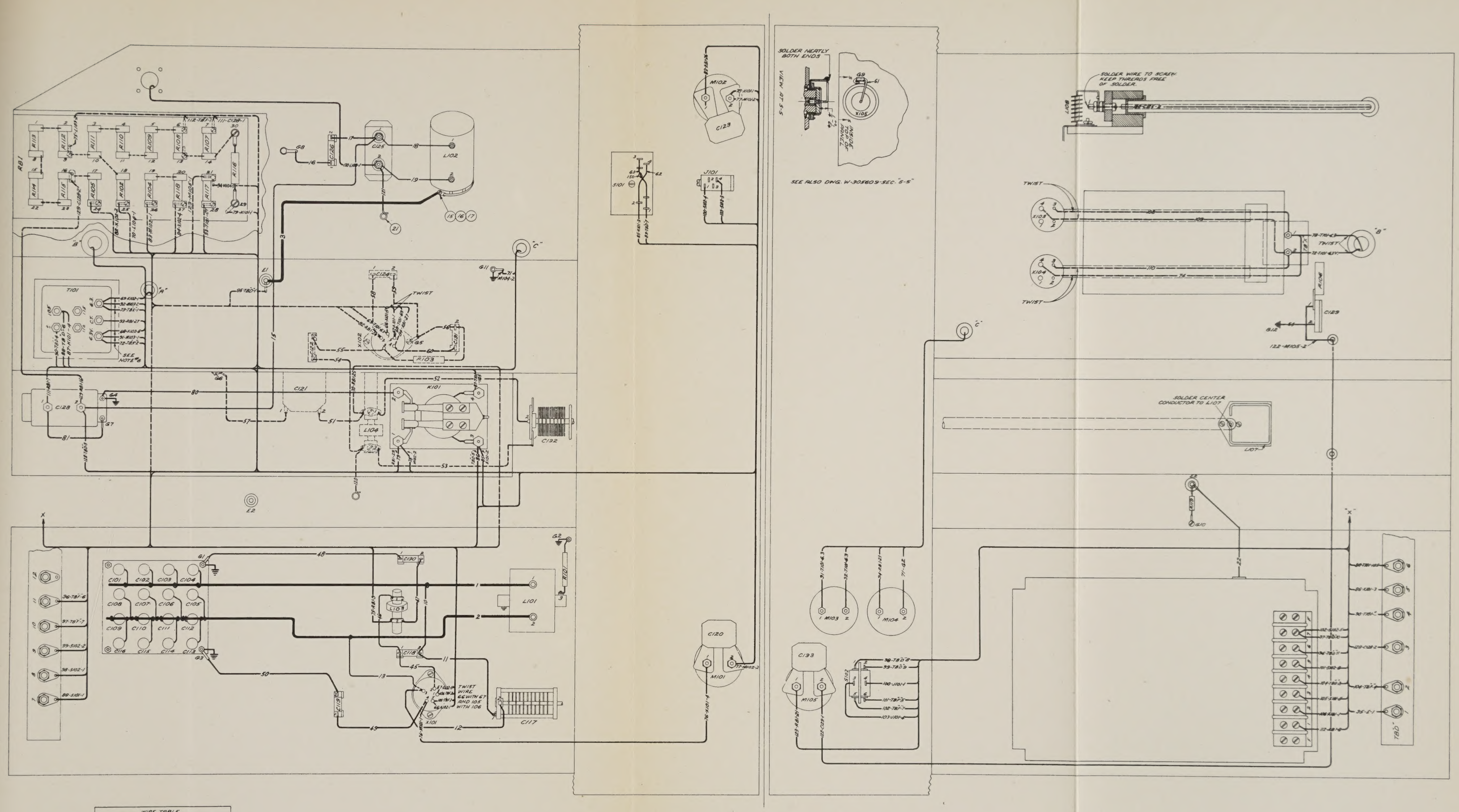
NOTE:- THE RESONANT LINE HAS DISTRIBUTED CONSTANTS (I.E. INDUCTANCE & CAPACITANCE). NO COMPONENTS OR PARTS OF THE ASSEMBLY CAN, THEREFORE, BE ASSIGNED SPECIFIC SYMBOL NUMBERS

Figure 28—Frequency Meter
(Schematic, K-875797)


SOLDER WIRE TO SCREW. KEEP THREADS FREE OF SOLDER.
RB1
R113
R112
R111
R110
R109
R108
R114
R115
R105
R102
R104
R118
"B"
T101
"A"
SEE NOTE #8
6.3V. C.T.
TWIST
R106
C129
G12
122-M105-2
C128
64
67
81
SOLDER CENTER CONDUCTOR TO L107
L107
G10
22
"X"
C101
C102
C103
C108
C107
C106
C109
C110
C111
C116
C115
C114
96-TBF-6
97-TBF-7
99-S102-2
98-S102-1
89-S101-1
102-S102-5
97-TBD-10
96-TBD-11
101-S102-6
104-TBD-3
105-X101-5
106-X101-1
112-RB1-6
86-X101-3
90-T101
128-C128-2
104-TBF-4
95-E-1
TBD

WIRE TABLE	
WIRE NO. K-875910	DESCRIPTION
1 TO 3 INCL.	P.S.105 .128 DIA.
10 TO 19 INCL.	P.S.105 .064 DIA.
45 TO 64 INCL.	P.S.105 .050 DIA B
66 TO 112 INCL.	P.S.533-9 BLK.26-.01
120 TO 128 INCL.	P.S.533-7 BLK.16-.010
128 TO 138 INCL.	P.S.538 16-.010 600
150	P.S.8 .055 I.D.SLE

Figure 29—Radio Transmitter, R-F Section (Wiring, W-305639)


SOLDER NEATLY BOTH ENDS
VIEW AT 5-5
SEE ALSO DWG. W-305609-SEC. "5-5"
SOLDER WIRE TO SCREW. KEEP THREADS FREE OF SOLDER.
SOLDER CENTER CONDUCTOR TO L107
TWIST
TWIST WIRE 66 WITH 67 AND 105 WITH 106
SEE NOTE #6
RB1
T101
K101
L101
L102
L103
L104
L107
L108
C117
C120
C121
C123
C128
C129
C132
C133
M101
M102
M103
M104
M105
X101
X102
X103
X104
X105
S101
J101
TB1
"A"
"B"
"C"
"X"

WIRE NO. K-875910	DESCRIPTION	ITEM NO. K-875913
1 TO 3 INCL.	P.S.105 .128 DIA. BUS	8
10 TO 19 INCL.	P.S.105 .064 DIA. BUS	9
45 TO 64 INCL.	P.S.105 .060 DIA BUS	10
66 TO 112 INCL.	P.S.533-9 BLK.26-.010 V.C.INS.	12
120 TO 127 INCL.	P.S.533-7 BLK.16-.010 V.C.INS.	13
128 TO 138 INCL.	P.S.538 16-.010 600 VOLTS	14
150	P.S.6 .055 I.D.SLEEVING	11

NOTE #1:-
NUMBERS IN WIRES REFER TO WIRE TABLE & DESTINATION OF WIRE, NOS IN BALLOONS REFER TO WIRING MATERIAL LIST K-875913

NOTE #2:-
CRIMP & SOLDER ALL ELECTRICAL CONNECTIONS USING SOLDER, P-19.

NOTE #3:-
CABLE AND LACE WIRES WHERE POSSIBLE USING LINEN CORD, PT. 18.

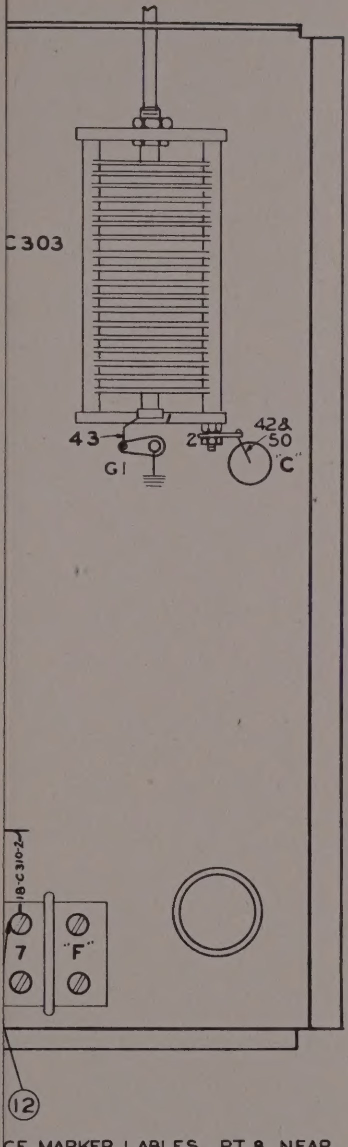
NOTE #4:-
USE TERMINALS PTS. 4,5,6,7 & 25 TO SUIT TERMINAL MTG. SCREW & WIRE.

NOTE #5:-
TWIST ALL 6.3 VOLT WHERE POSSIBLE.

NOTE #6:-
SWAGE .128 DIA. BUS WIRE

NOTE #7:-
PLACE MARKER LABELS NEAR RESPECTIVE ITEMS USING CLEAR LACQUER PT.23, THEN APPLY TWO COATS OF CLEAR LACQUER OVER MARKER LABELS.

Figure 29—Radio Transmitter, R-F Section (Wiring, W-305639)

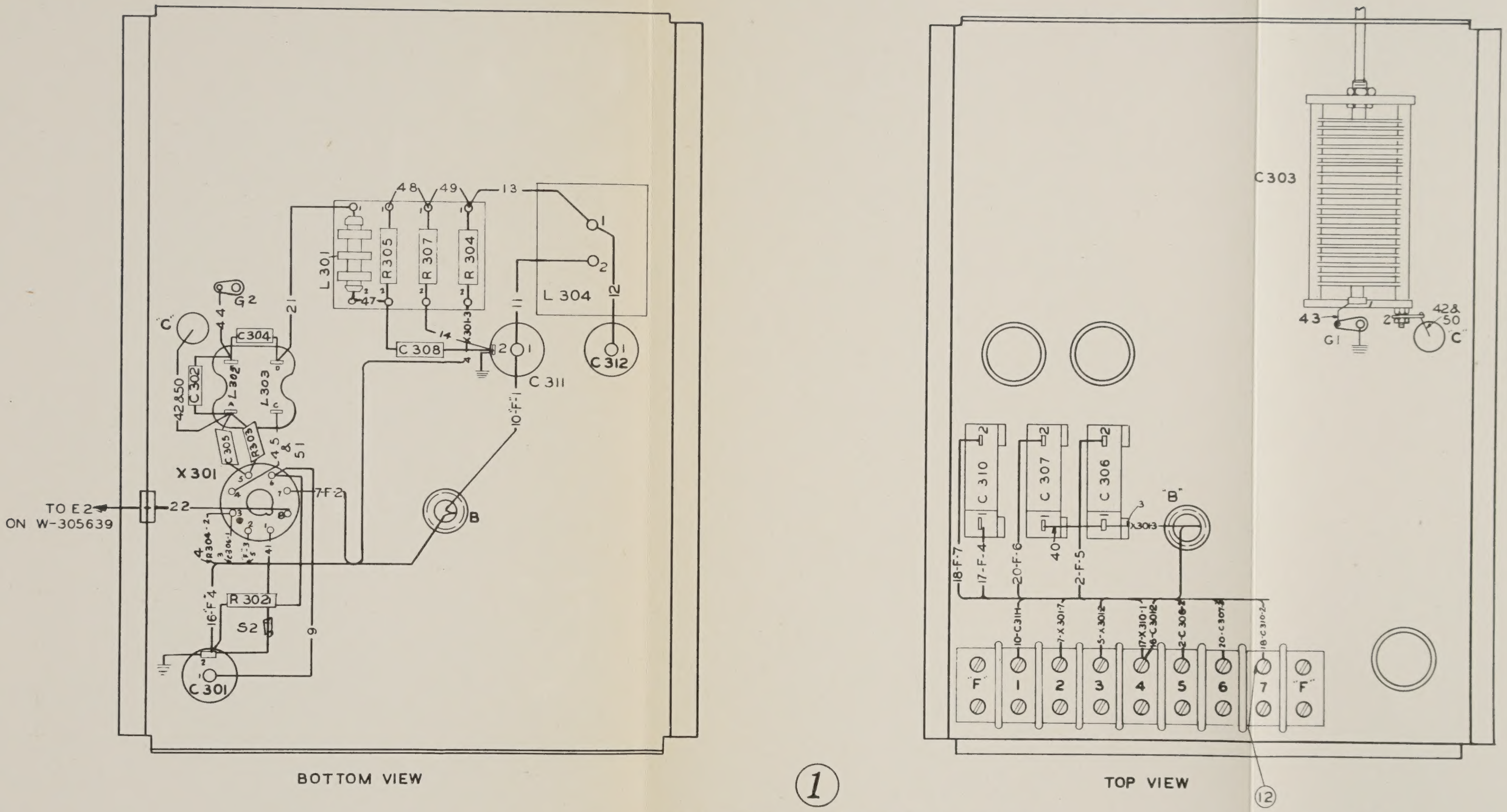


WIRE TABLE		
WIRE NO. K-875242	DESCRIPTION	ITEM NO. K-87524.
2-5,7, 9-12 INCL	P.S. 533-7 BLACK	4
13-14 INCL.	P.S. 105.050 DIA.BUS.	5
16-22 INCL.	P.S. 533-7 BLACK	4
40-45 INCL.	P.S. 105.050 DIA. BUS.	5
47-49 INCL.	P.S. 105.032 DIA. BUS.	6
50-52 INCL.	P.S. 8.051 I.D. SLEEVING	7

ON

CE MARKER LABLES PT. 8 NEAR
IR RESPECTIVE ITEMS USING CLEAR
QUER, THEN APPLY THREE COATS
PT. 9 OVER THE LABELS.

Figure 30—Radio Transmitter, Monitor (Wiring, P-721277)


TO E2 ON W-305639
22
X 301
C305
R303
4,5 & 51
7-F-2
R304-2
C304-1
F-3
41
16-F-4
R 302
S2
9
C 301
C
G2
44
C304
C302
L302
L303
42&50
21
L 301
47
48
49
13
R 305
R 307
R 304
C 308
14
X301-3
11
12
L 304
1
2
C 311
C 312
10-F-1
B
C 303
43
G1
42&50
2
C
C 310
C 307
C 306
"B"
3
X301-3
18-F-7
17-F-4
20-F-6
40
2-F-5
10-C311-1
7-X301-7
5-X301-2
17-X310-1
16-C301-2
2-C306-2
20-C307-2
18-C310-2
"F"
1
2
3
4
5
6
7
"F"
12

BOTTOM VIEW

TOP VIEW

NOTE 1 - NUMBERS IN WIRES REFER TO WIRE TABLE.

NOTE 2 - CRIMP AND SOLDER ALL ELECTRICAL CONNECTIONS, USING SOLDER PT. 10.

NOTE 3 - NUMBERS IN BALLOONS REFER TO WIRING MATERIAL LIST K-8/5241.

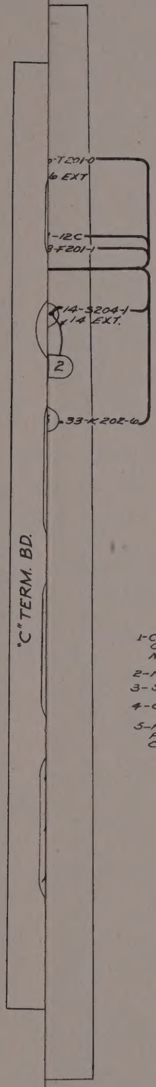
NOTE 4 - CABLE AND LACE WIRES WHERE POSSIBLE, USING LINEN CORD PT. 19

NOTE 5 - PLACE MARKER LABLES PT. 8 NEAR THEIR RESPECTIVE ITEMS USING CLEAR LACQUER, THEN APPLY THREE COATS OF PT. 9 OVER THE LABELS.

WIRE TABLE

WIRE NO. K-875242	DESCRIPTION	ITEM NO. K-87524.
2-5,7,9-12 INCL.	P.S. 533-7 BLACK	4
13-14 INCL.	P.S. 105.050 DIA. BUS.	5
16-22 INCL.	P.S. 533-7 BLACK	4
40-45 INCL.	P.S. 105.050 DIA. BUS.	5
47-49 INCL.	P.S. 105.032 DIA. BUS.	6
50-52 INCL.	P.S. 8.051 I.D. SLEEVING	7

Figure 30—Radio Transmitter, Monitor (Wiring, P-721277)



WIRE Nº	DESCRIPTION
1-35	PS-533-11, 41/.010, BLACK
41-47	PS 538, 26/.010, BLACK, 600V.
51-53	PS 533-9, 26/.010, BLACK.
61-63 65-69	PS 105, .064 DIA. BARE
71-73	PS 8, VARN. TUBING, .066 I.D. BLK.

NOTES

1-CODING AT ENDS OF WIRE SHOWS ITS Nº & DESTINATION RESP. WHERE ONLY ONE Nº IS GIVEN-WIRE Nº IS INTENDED. A LETTER PRECEDING A Nº (AS R201) INDICATES AN ELECTRICAL ITEM.

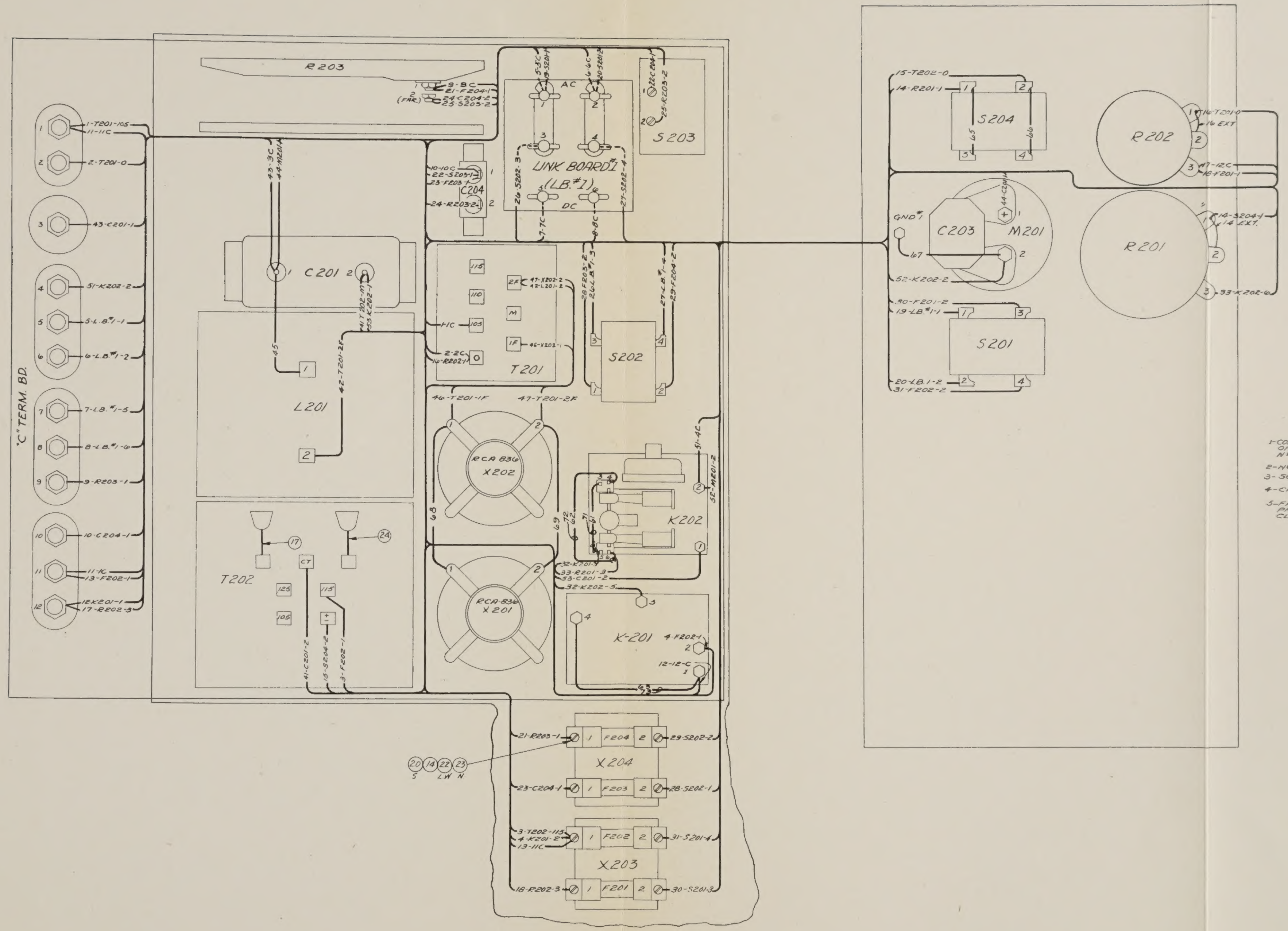
2-NºS IN CIRCLES REFER TO PART NºS ON WIRING MATERIAL LIST K-875256.

3-SOLDER CONNECTIONS USING P-9 AFTER CRIMPING.

4-CABLE WIRES WHERE POSSIBLE & LACE USING P-10.

5-FASTEN MARKER LABELS P18 ADJACENT TO (BUT NOT ON) ELECTRICAL PARTS, USING CLEAR LACQUER P-19 THEN APPLY 3 COATS OF CLEAR LACQUER P19 TO EACH LABEL.

Figure 31—Radio Transmitter, Power Supply (Wiring, T-620764)


R203
"C" TERM. BD.
C201
L201
T202
LINK BOARD #1 (L.B. #1)
AC
DC
S203
C204
T201
S202
RCA 836 X202
RCA 836 X201
K202
K-201
X204
F204
F203
X203
F202
F201
S204
R202
C203
M201
R201
S201
GND #1

WIRE Nº	DESCRIPTION
1-35	PS-533-11, 41/.010, BLACK
41-47	PS 538, 26/.010, BLACK, 600V.
51-53	PS 533-9, 26/.010, BLACK.
61-63 65-69	PS 105, .064 DIA. BARE
71-73	PS 8, VARN. TUBING, .066 I.D. BLK.

NOTES

1-CODING AT ENDS OF WIRE SHOWS ITS Nº & DESTINATION RESP. WHERE ONLY ONE Nº IS GIVEN-WIRE Nº IS INTENDED. A LETTER PRECEDING A Nº (AS R201) INDICATES AN ELECTRICAL ITEM.

2-NºS IN CIRCLES REFER TO PART NºS ON WIRING MATERIAL LIST K-875256.

3-SOLDER CONNECTIONS USING P-9 AFTER CRIMPING.

4-CABLE WIRES WHERE POSSIBLE & LACE USING P-10.

5-FASTEN MARKER LABELS P18 ADJACENT TO (BUT NOT ON) ELECTRICAL PARTS, USING CLEAR LACQUER P-19 THEN APPLY 3 COATS OF CLEAR LACQUER P19 TO EACH LABEL.

Figure 31—Radio Transmitter, Power Supply (Wiring, T-620764)

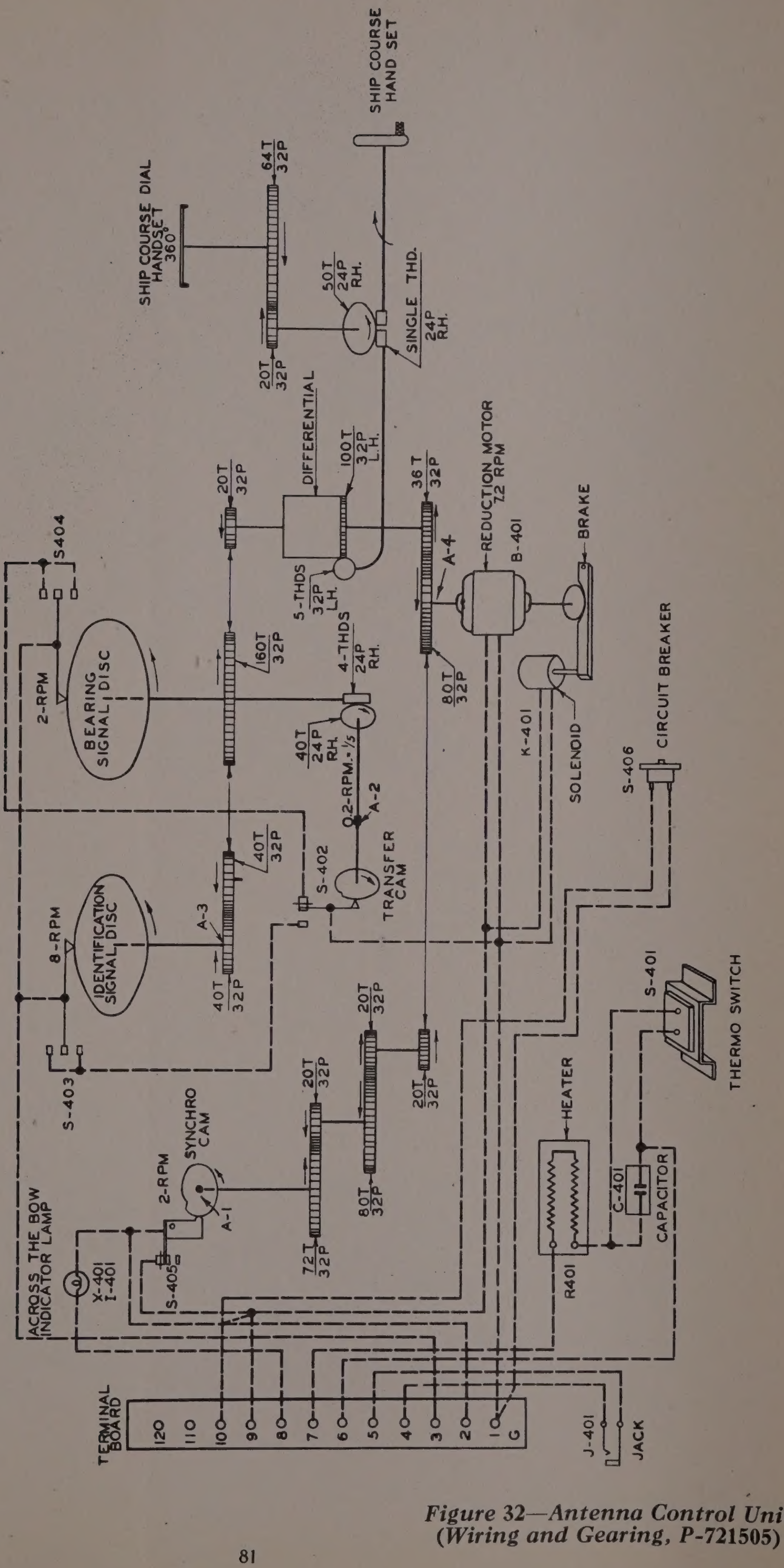
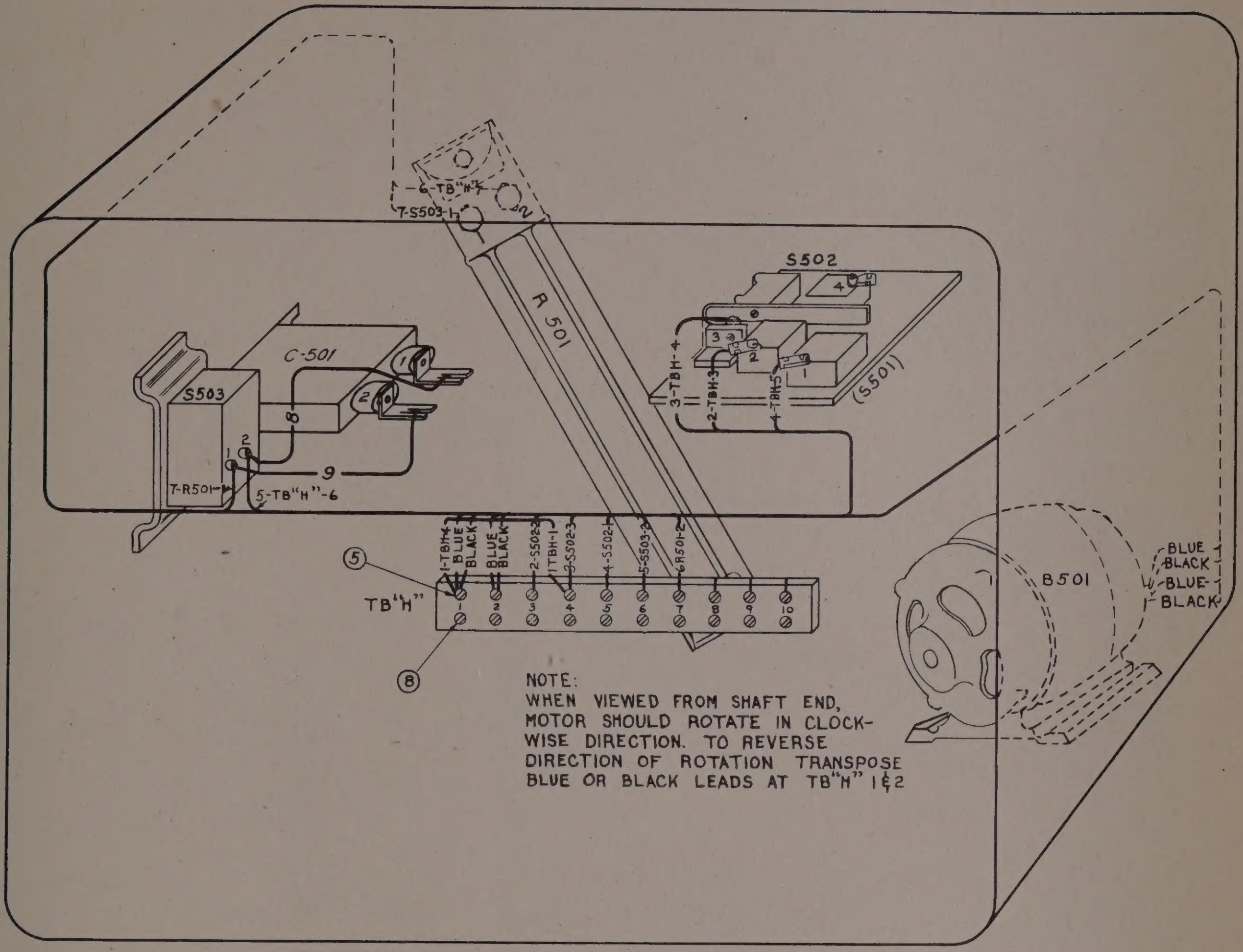

SHIP COURSE HAND SET
SHIP COURSE DIAL HANDSET 360°
64T 32P
20T 32P
50T 24P R.H.
SINGLE THD. 24P R.H.
DIFFERENTIAL
100T 32P L.H.
20T 32P
S404
5-THDS 32P L.H.
36 T 32P
REDUCTION MOTOR 7.2 RPM
B-401
A-4
BRAKE
BEARING SIGNAL DISC
2-RPM
160T 32P
4-THDS 24P RH.
80T 32P
K-401
SOLENOID
40T 24P RH.
0.2-RPM.÷1/5
A-2
TRANSFER CAM
S-402
40T 32P
S-406
CIRCUIT BREAKER
IDENTIFICATION SIGNAL DISC
8-RPM
A-3
40T 32P
S-403
20T 32P
20T 32P
20T 32P
S-401
THERMO SWITCH
SYNCHRO CAM
2-RPM
A-1
80T 32P
72T 32P
HEATER
C-401
CAPACITOR
R401
S-405
ACROSS THE BOW INDICATOR LAMP
X-401
I-401
TERMINAL BOARD
120
110
100
90
80
70
60
50
40
30
20
10
G
J-401
JACK

Figure 32—Antenna Control Unit (Wiring and Gearing, P-721505)


6-TB"H"-7
7-S503-1
2
R 501
S502
4
3
2
1
(S501)
3-TBH-4
2-TBH-3
4-TBH-5
C-501
1
2
S503
8
2
1
9
7-R501
5-TB"H"-6
1-TBH-4
BLUE
BLACK
BLUE
BLACK
2-S502-2
1TBH-1
3-S502-3
4-S502-1
5-S503-2
6R501-2
⑤
TB"H"
1
2
3
4
5
6
7
8
9
10
⑧
B501
BLUE
BLACK
BLUE
BLACK

NOTE:
WHEN VIEWED FROM SHAFT END, MOTOR SHOULD ROTATE IN CLOCKWISE DIRECTION. TO REVERSE DIRECTION OF ROTATION TRANSPOSE BLUE OR BLACK LEADS AT TB"H" 1&2

NOTE#1:
CABLE & LACE WIRES WHERE POSSIBLE USING PT. 6 LINEN CORD.

NOTE#2:
CRIMP & SOLDER ALL ELECTRICAL CONNECTIONS.

NOTE#3:
USE TERMINALS PT. 5, 8 & 9 TO SUIT WIRE & TERMINAL MTG. SCREW.

NOTE#4:
NUMBERS IN WIRES REFER TO WIRE TABLE & DESTINATION OF WIRE. NUMBERS IN BALLOONS REFER TO WIRING MATERIAL LIST K-875702.

WIRE TABLE		
WIRE NO. K-875973	DESCRIPTION	ITEM NO. K-875702
1-9 INCL.	P.S. 533-9 26-.010 BLACK V.C.C.	4

Figure 33—Antenna Assembly (Wiring, P-721508)

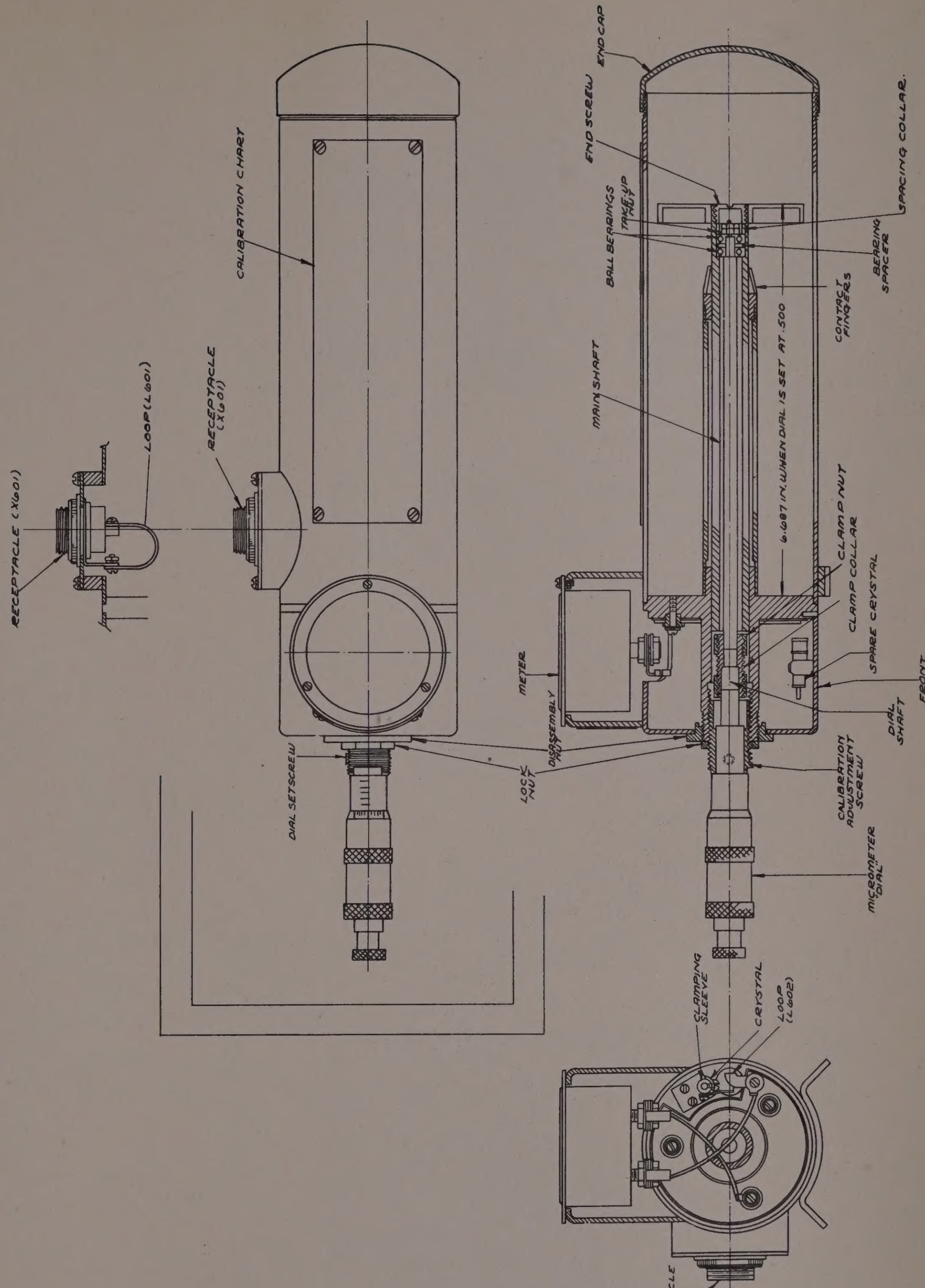

RECEPTACLE (X601)
LOOP (L601)
RECEPTACLE (X601)
CALIBRATION CHART
DIAL SETSCREW
LOCK NUT
DISASSEMBLY NUT
METER
END SCREW
END CAP
BALL BEARINGS
TAKE-UP NUT
SPACING COLLAR
BEARING SPACER
CONTACT FINGERS
MAIN SHAFT
6.687 IN, WHEN DIAL IS SET AT .500
CLAMP NUT
CLAMP COLLAR
SPARE CRYSTAL
FRONT COVER
DIAL SHAFT
CALIBRATION ADJUSTMENT SCREW
MICROMETER "DIAL"
CLAMPING SLEEVE
CRYSTAL
LOOP (L602)
RECEPTACLE (X601)
LOOP (L602)
CRYSTAL
CLAMPING SLEEVE

Figure 34—Frequency Meter (Wiring and Assembly, T-620788)

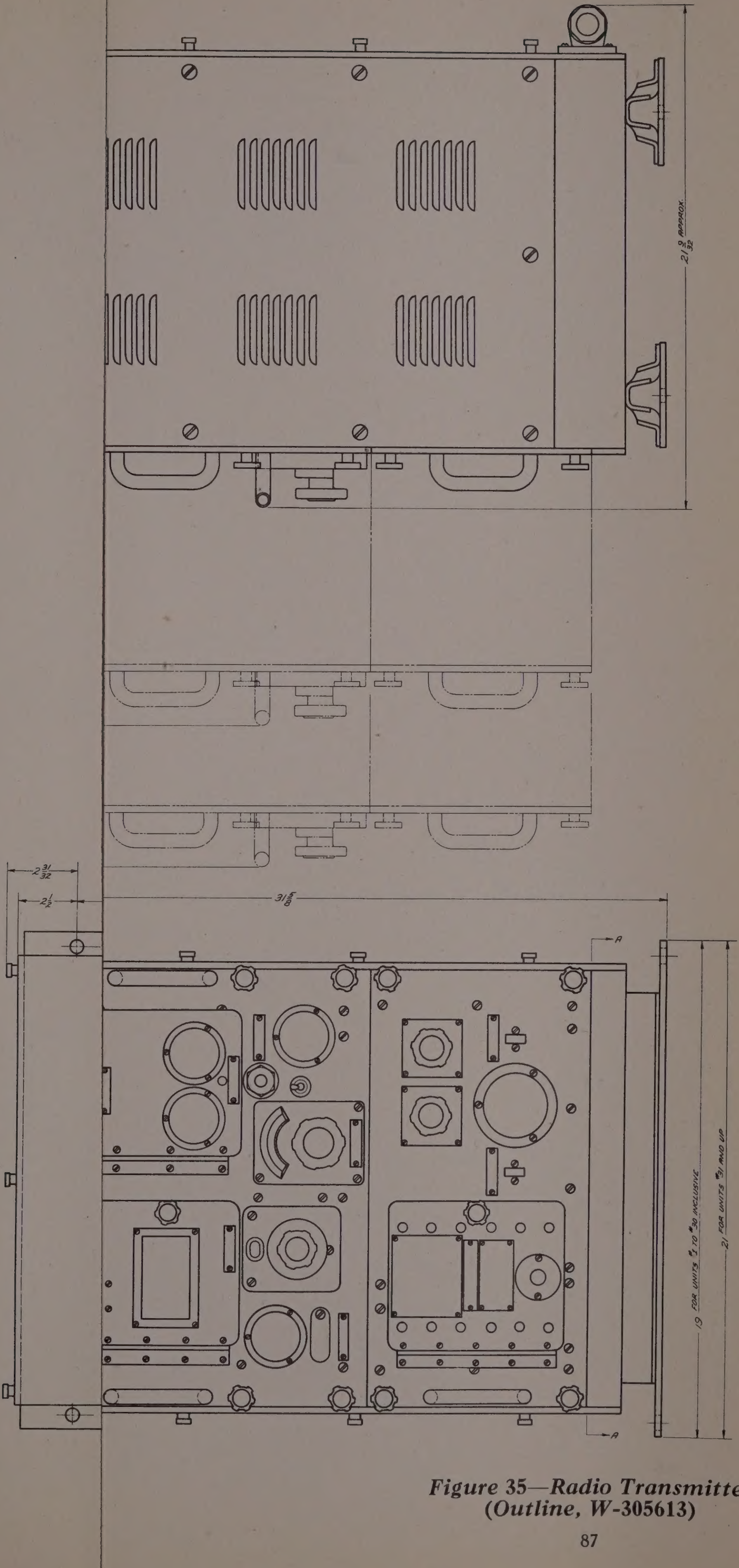

2 31/32
2 1/2
31 5/8
21 9/32 APPROX.
A
A
19 FOR UNITS #1 TO #30 INCLUSIVE
21 FOR UNITS #31 AND UP

Figure 35—Radio Transmitter (Outline, W-305613)

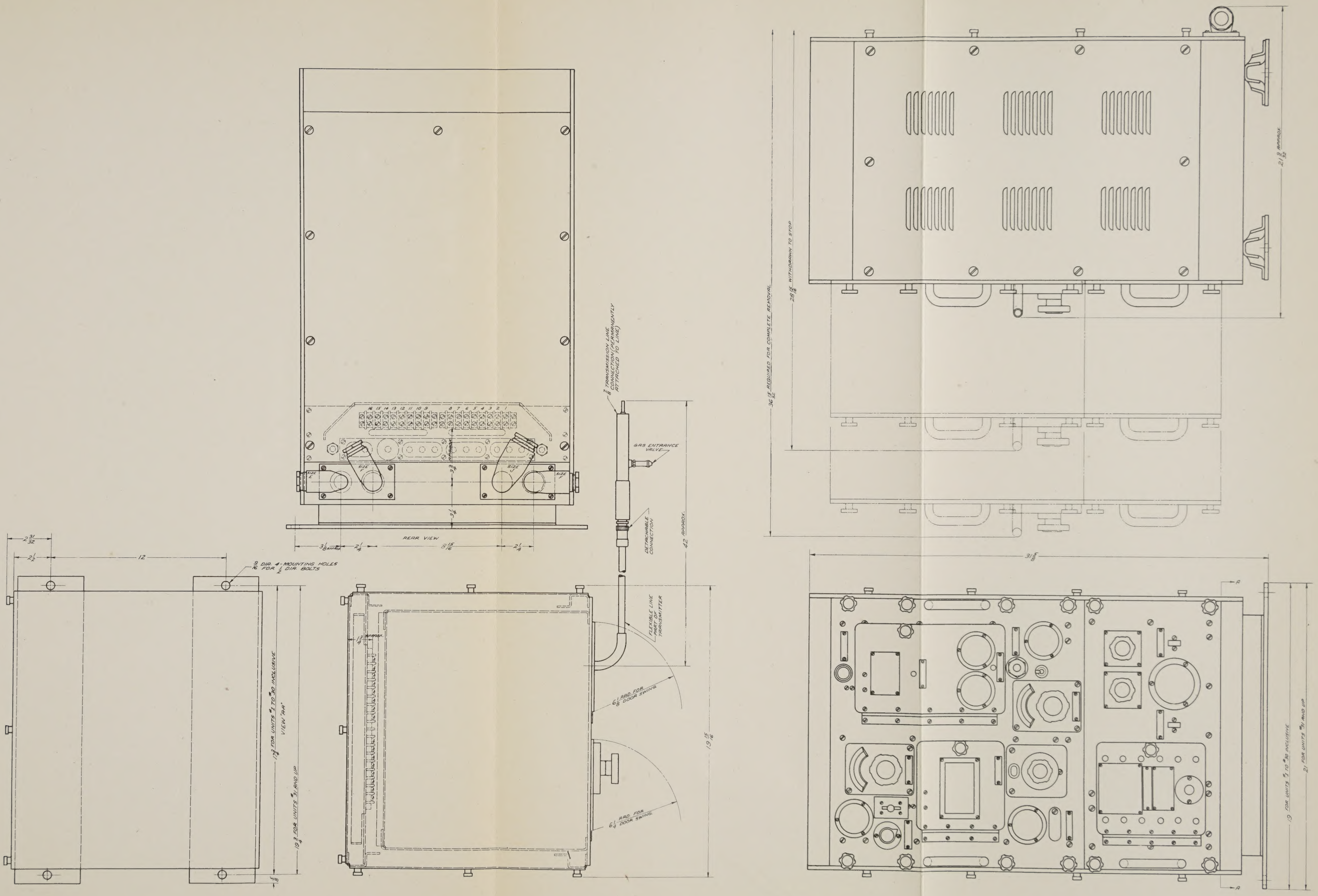

REAR VIEW
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
SIZE E
SIZE F
SIZE J
SIZE F
3 3/4 APPROX.
3 1/4
3 1/8 APPROX.
2 1/4
8 15/16
2 1/4
7/8 TRANSMISSION LINE CONNECTION (PERMANENTLY ATTACHED TO LINE)
GAS ENTRANCE VALVE
DETACHABLE CONNECTION
42 APPROX.
FLEXIBLE LINE PART OF TRANSMITTER
6 1/8 RAD. FOR DOOR SWING
6 1/4 RAD. FOR DOOR SWING
19 15/16
2 31/32
2 1/2
12
9/16 DIA. 4-MOUNTING HOLES FOR 1/2 DIA. BOLTS
17 3/4 FOR UNITS #1 TO #30 INCLUSIVE
VIEW "AA"
19 3/4 FOR UNITS #31 AND UP
5/8
1 3/4 APPROX.
36 15/32 REQUIRED FOR COMPLETE REMOVAL
28 15/16 WITHDRAWN TO STOP
21 9/32 APPROX.
31 5/8
A
A
19 FOR UNITS #1 TO #30 INCLUSIVE
21 FOR UNITS #31 AND UP

Figure 35—Radio Transmitter (Outline, W-305613)

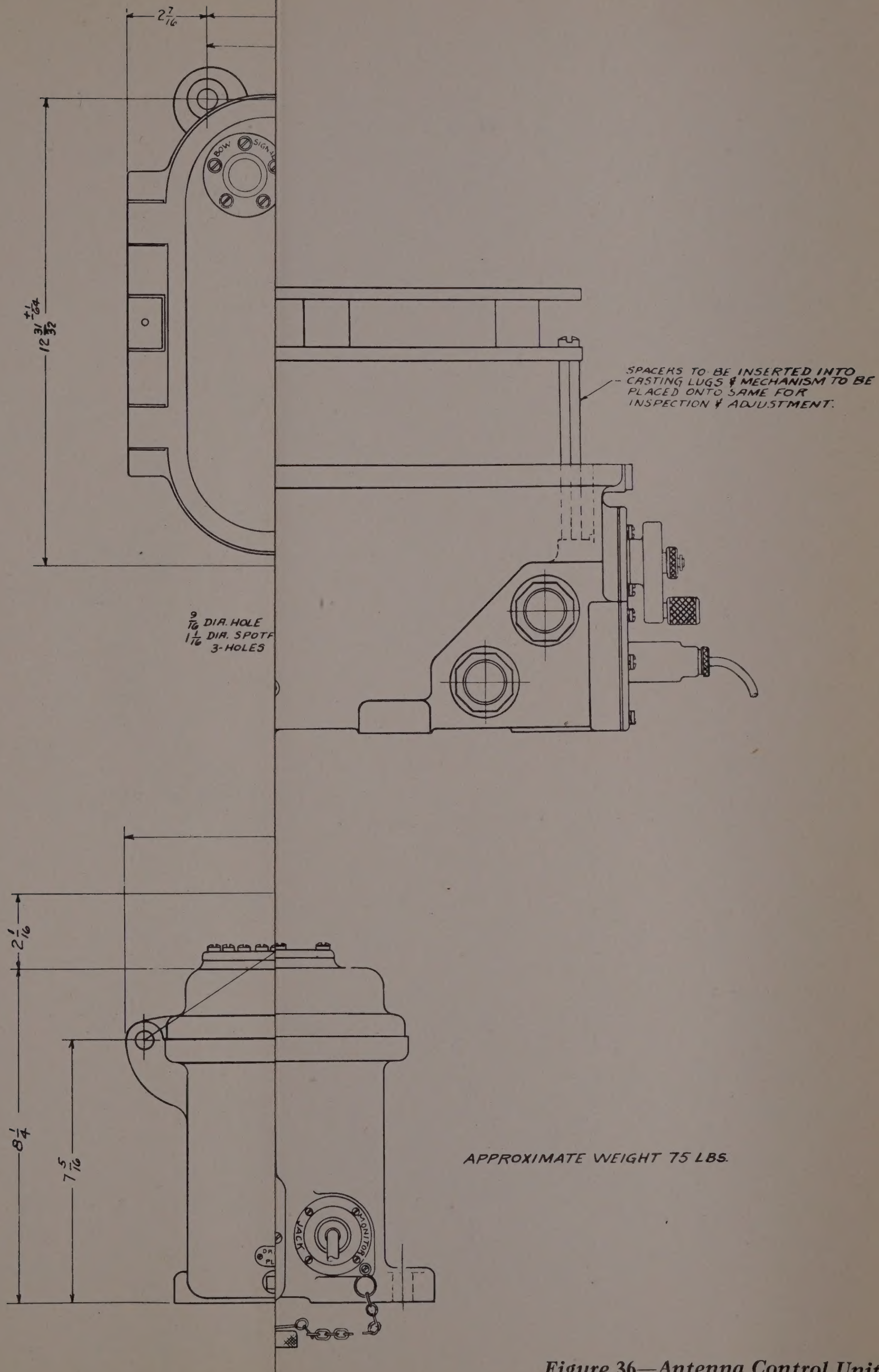
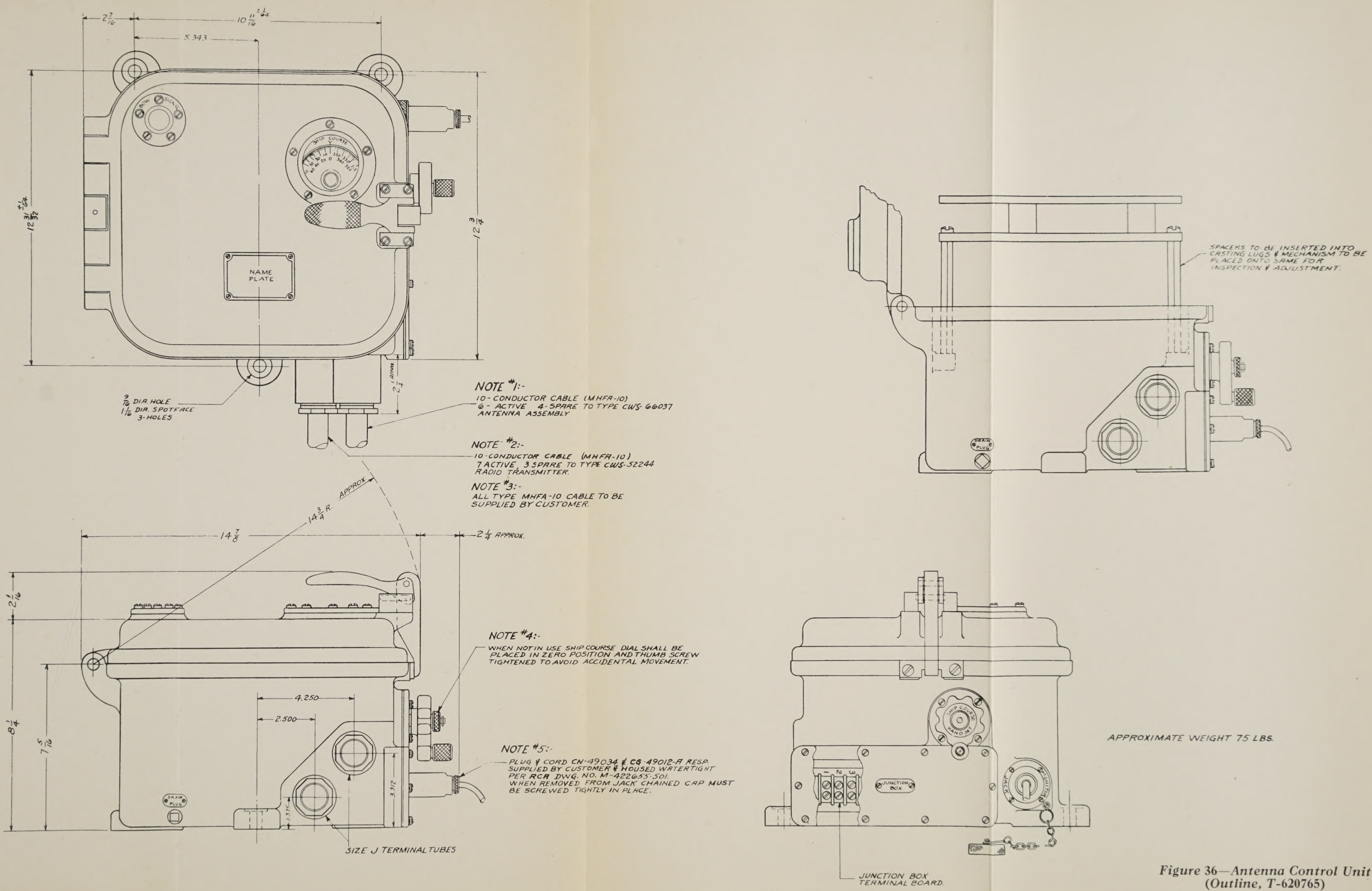

2 7/16
BOW
SIGN
12 31/32 +1/64
SPACERS TO BE INSERTED INTO CASTING LUGS & MECHANISM TO BE PLACED ONTO SAME FOR INSPECTION & ADJUSTMENT.
9/16 DIA. HOLE
1 1/16 DIA. SPOTF
3-HOLES
2 1/16
8 1/4
7 5/16
APPROXIMATE WEIGHT 75 LBS.
JACK
MONITOR

Figure 36—Antenna Control Unit
(Outline, T-620765)


$2\frac{7}{16}$
$10\frac{11}{16}\pm\frac{1}{64}$
5.343
$12\frac{31}{32}\pm\frac{1}{64}$
$12\frac{3}{4}$
SHIP COURSE
NAME PLATE
$2\frac{1}{4}$ APPROX
$\frac{9}{16}$ DIA. HOLE
$1\frac{1}{16}$ DIA. SPOTFACE
3-HOLES
$14\frac{3}{4}$ R. APPROX.
$14\frac{7}{8}$
$2\frac{1}{4}$ APPROX.
$2\frac{1}{16}$
$8\frac{1}{4}$
$7\frac{5}{16}$
4.250
2.500
3.312
1.375
DRAIN PLUG
SIZE J TERMINAL TUBES
SHIP COURSE HAND SET
JUNCTION BOX
JACK
JUNCTION BOX TERMINAL BOARD.

NOTE #1:-
10-CONDUCTOR CABLE (MHFA-10)
6-ACTIVE 4-SPARE TO TYPE CWS-66037
ANTENNA ASSEMBLY

NOTE #2:-
10-CONDUCTOR CABLE (MHFA-10)
7 ACTIVE, 3 SPARE TO TYPE CWS-52244
RADIO TRANSMITTER.

NOTE #3:-
ALL TYPE MHFA-10 CABLE TO BE
SUPPLIED BY CUSTOMER.

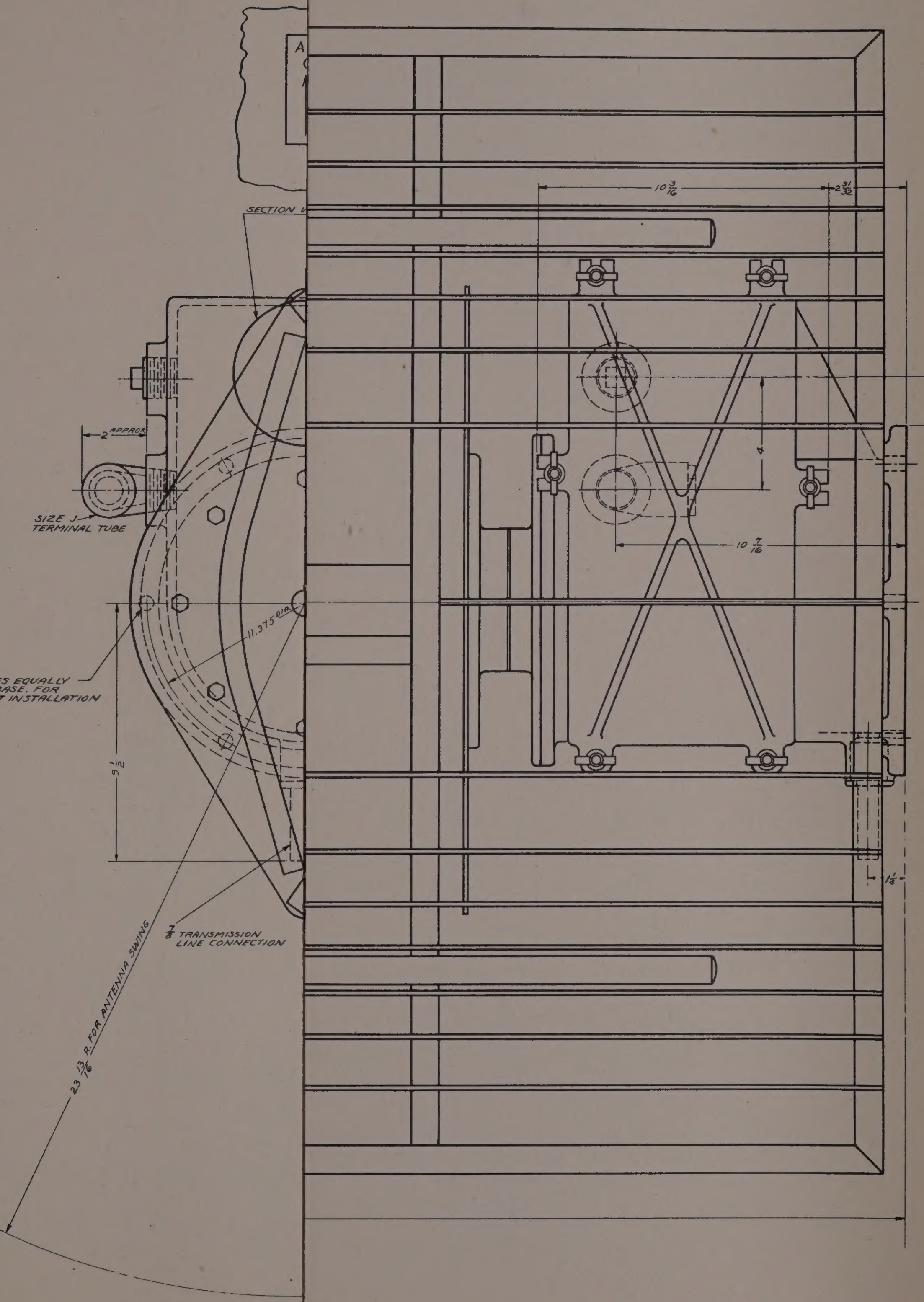
NOTE #4:-
WHEN NOT IN USE SHIP COURSE DIAL SHALL BE
PLACED IN ZERO POSITION AND THUMB SCREW
TIGHTENED TO AVOID ACCIDENTAL MOVEMENT.

NOTE #5:-
PLUG & CORD CN-49034 & CG-49012-A RESP.
SUPPLIED BY CUSTOMER & HOUSED WATERTIGHT
PER RCA DWG. NO. M-422655-501.
WHEN REMOVED FROM JACK CHAINED CAP MUST
BE SCREWED TIGHTLY IN PLACE.

SPACERS TO BE INSERTED INTO
CASTING LUGS & MECHANISM TO BE
PLACED ONTO SAME FOR
INSPECTION & ADJUSTMENT.

APPROXIMATE WEIGHT 75 LBS.

Figure 36—Antenna Control Unit (Outline, T-620765)



A
SECTION V
10 3/16
2 31/32
1 3/4
4
10 7/16
1 1/4
2 APPROX
SIZE J TERMINAL TUBE
11.375 DIA.
31/64 DIA.-6-HOLES EQUALLY SPACED IN BASE. FOR 7/16 DIA. BOLTS AT INSTALLATION
9 1/2
7/8 TRANSMISSION LINE CONNECTION
23 13/16 R. FOR ANTENNA SWING

Figure 37—Antenna Assembly (Outline, W-305612)

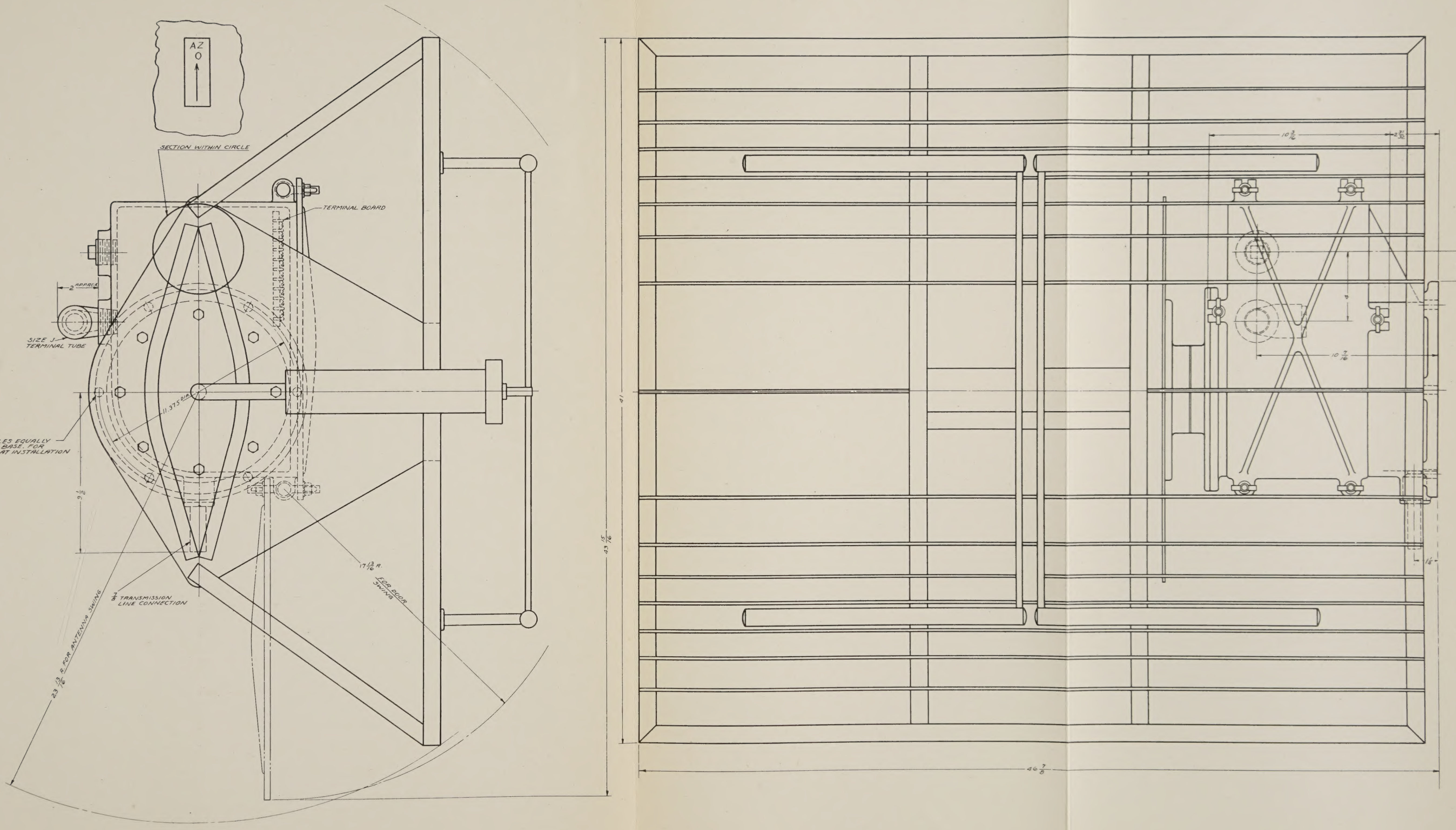

AZ
0
SECTION WITHIN CIRCLE
TERMINAL BOARD
2 APPROX
SIZE J TERMINAL TUBE
11.375 DIA.
$\frac{31}{64}$ DIA.-6-HOLES EQUALLY SPACED IN BASE. FOR $\frac{7}{16}$ DIA. BOLTS AT INSTALLATION
$9\frac{1}{2}$
$\frac{7}{8}$ TRANSMISSION LINE CONNECTION
$23\frac{13}{16}$ R. FOR ANTENNA SWING
$17\frac{13}{16}$ R.
FOR DOOR SWING
41
$43\frac{15}{16}$
$46\frac{7}{8}$
$10\frac{3}{16}$
$2\frac{31}{32}$
$1\frac{3}{4}$
4
$10\frac{7}{16}$
$1\frac{1}{8}$

Figure 37—Antenna Assembly
(Outline, W-305612)

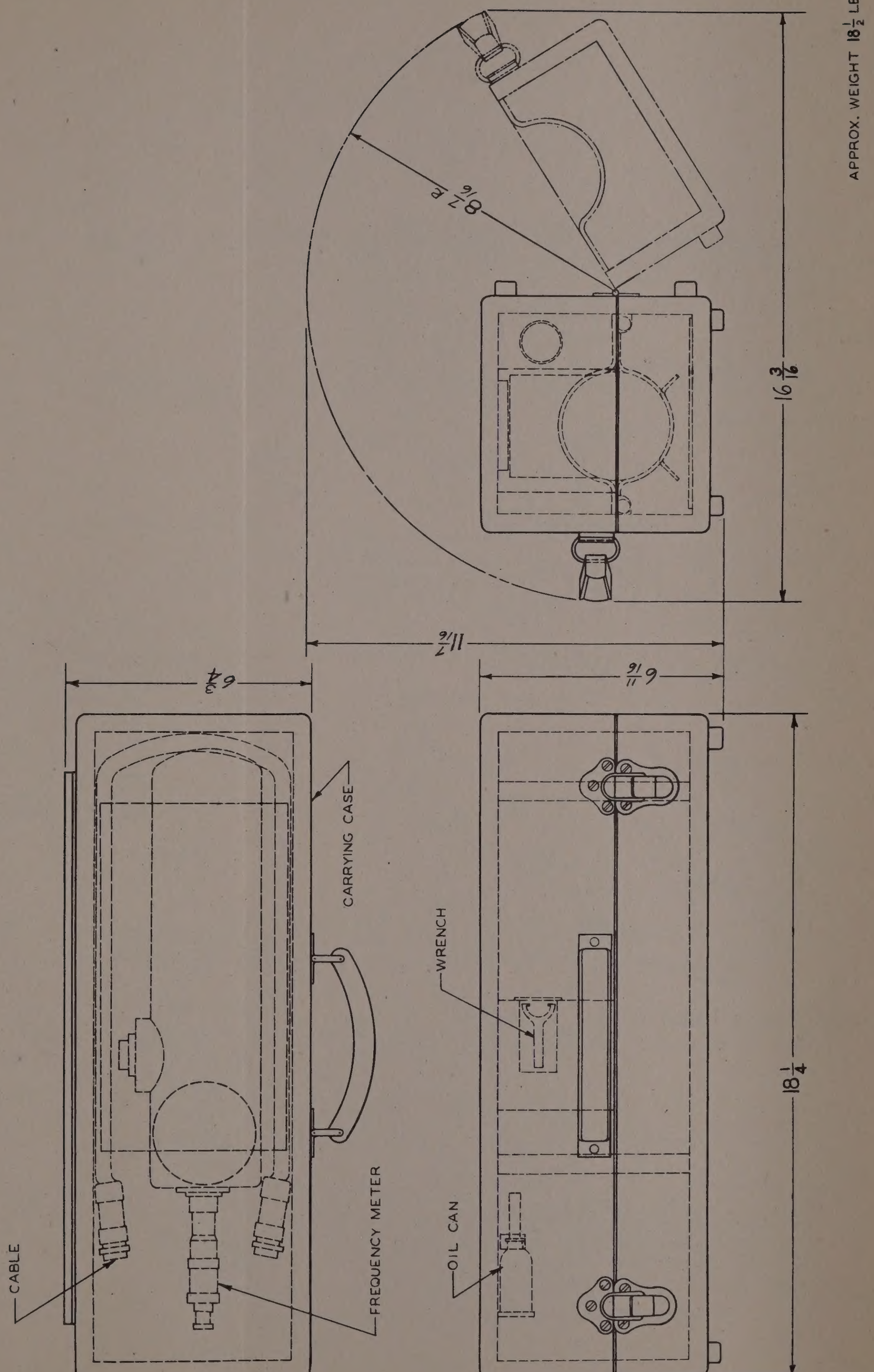
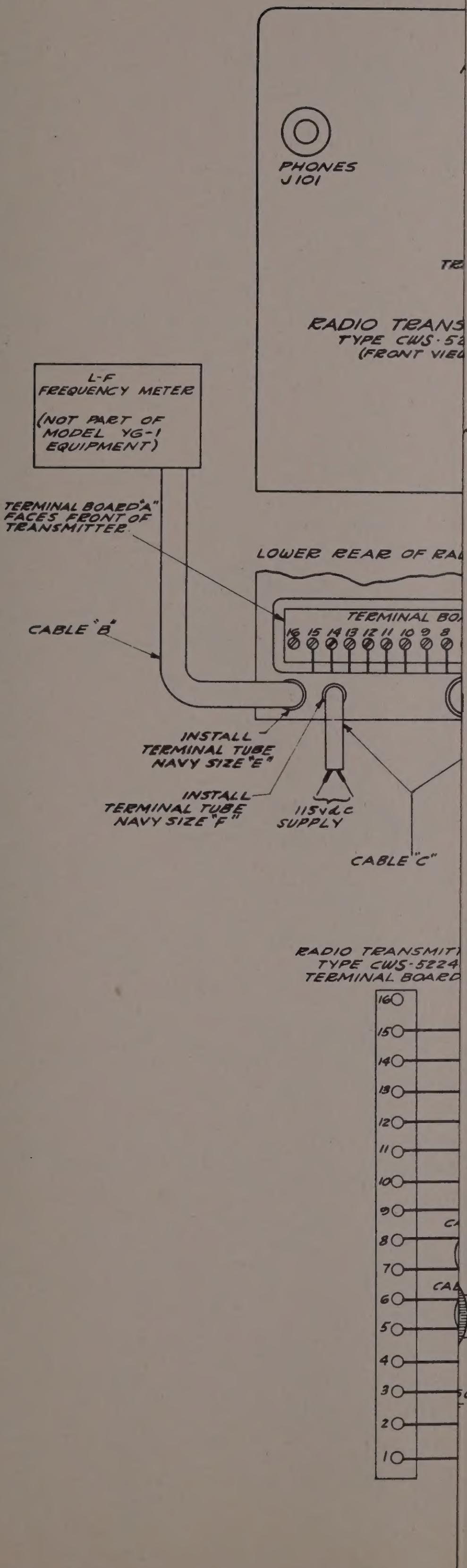

APPROX. WEIGHT 18½ LBS.
8 7/16 R
16 3/16
11 7/16
6 3/4
6 11/16
CARRYING CASE
WRENCH
CABLE
FREQUENCY METER
OIL CAN
18 1/4

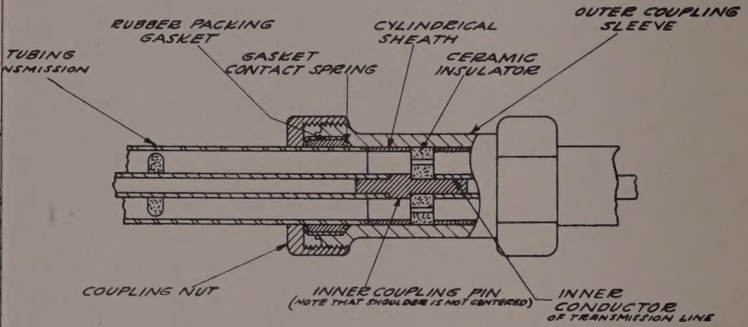
Figure 38—Frequency Meter (Outline, P-721295)


PHONES
J101
TR
RADIO TRANS
TYPE CWS-52
(FRONT VIE
L-F
FREQUENCY METER
(NOT PART OF
MODEL YG-1
EQUIPMENT)
TERMINAL BOARD "A"
FACES FRONT OF
TRANSMITTER
LOWER REAR OF RA
TERMINAL BO
16 15 14 13 12 11 10 9 8
CABLE "B"
INSTALL
TERMINAL TUBE
NAVY SIZE "E"
INSTALL
TERMINAL TUBE
NAVY SIZE "F"
115V AC
SUPPLY
CABLE "C"
RADIO TRANSMIT
TYPE CWS-5224
TERMINAL BOARD
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
CA
CA
01A
AS P601B

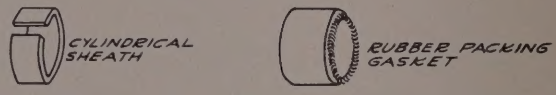
INTERCONNECTING CABLE REQUIREMENTS

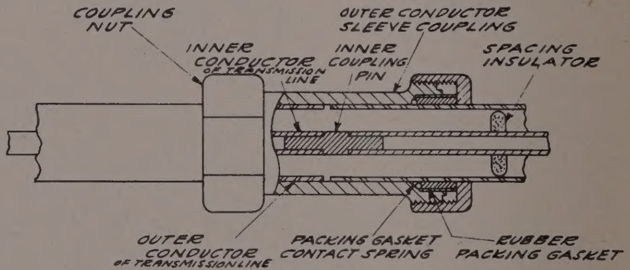
DESIGNATION THIS DWG.	NUMBER OF CABLES USED	NAVY TYPE NUMBER	NUMBER OF ACTIVE WIRES	NUMBER OF SPARE WIRES
CABLE "A"	1	MHFA-10	7	3
CABLE "B"	1	MHFA-4	4	0
CABLE "C"	2	THFA-4	2	1
CABLE "D"	1	MHFA-10	6	4
CABLE "E"	1	REFER TO ASSEMBLY DWG. FIG. 25		

NOTE:- CABLES A, B, C & D ARE NOT SUPPLIED WITH THIS EQUIP.

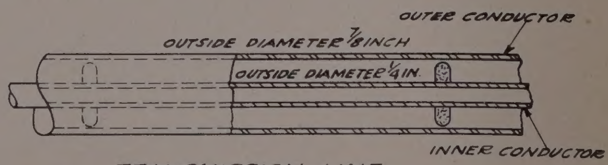

TUBING
NSMISSION
RUBBER PACKING
GASKET
GASKET
CONTACT SPRING
CYLINDRICAL
SHEATH
CERAMIC
INSULATOR
OUTER COUPLING
SLEEVE
COUPLING NUT
INNER COUPLING PIN
(NOTE THAT SHOULDER IS NOT CENTERED)
INNER
CONDUCTOR
OF TRANSMISSION LINE

ANCHOR JOINT ASSEMBLY


CYLINDRICAL
SHEATH
RUBBER PACKING
GASKET

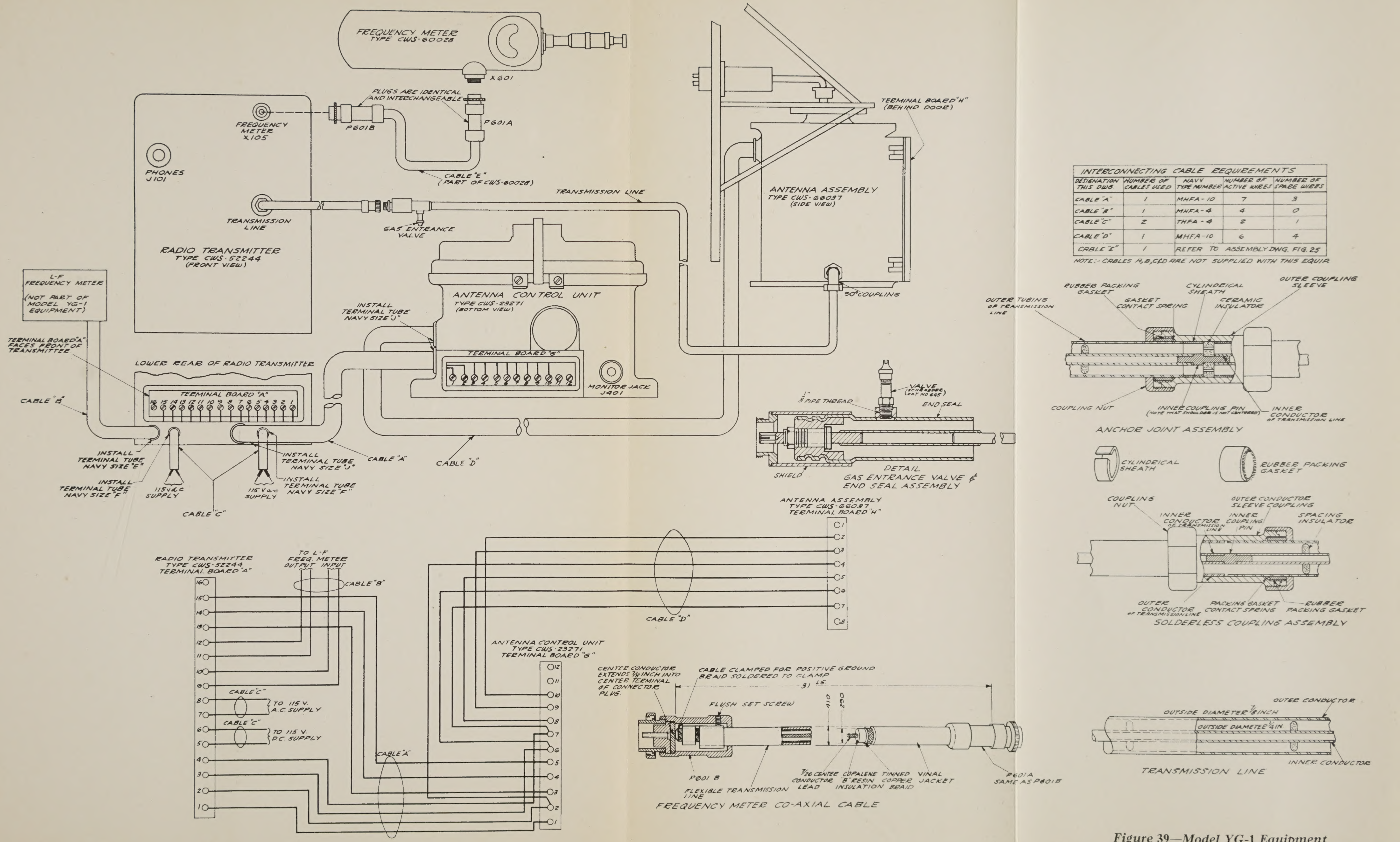

COUPLING
NUT
INNER
CONDUCTOR
OF TRANSMISSION
LINE
OUTER CONDUCTOR
SLEEVE COUPLING
INNER
COUPLING
PIN
SPACING
INSULATOR
OUTER
CONDUCTOR
OF TRANSMISSION LINE
PACKING GASKET
CONTACT SPRING
RUBBER
PACKING GASKET

SOLDERLESS COUPLING ASSEMBLY


OUTER CONDUCTOR
OUTSIDE DIAMETER 7/8 INCH
OUTSIDE DIAMETER 1/4 IN.
INNER CONDUCTOR

TRANSMISSION LINE

Figure 39—Model YG-1 Equipment (Interconnections and Cable Identification, T-620783)


FREQUENCY METER
TYPE CWS-60028
X601
PLUGS ARE IDENTICAL AND INTERCHANGEABLE
FREQUENCY METER
X105
P601B
P601A
PHONES
J101
CABLE "E"
(PART OF CWS-60028)
TRANSMISSION LINE
TRANSMISSION LINE
GAS ENTRANCE VALVE
RADIO TRANSMITTER
TYPE CWS-52244
(FRONT VIEW)
TERMINAL BOARD "H"
(BEHIND DOOR)
ANTENNA ASSEMBLY
TYPE CWS-66037
(SIDE VIEW)
90° COUPLING
L-F FREQUENCY METER
(NOT PART OF MODEL YG-1 EQUIPMENT)
ANTENNA CONTROL UNIT
TYPE CWS-23271
(BOTTOM VIEW)
INSTALL TERMINAL TUBE NAVY SIZE "J"
TERMINAL BOARD "A" FACES FRONT OF TRANSMITTER
TERMINAL BOARD "G"
1 2 3 4 5 6 7 8 9 10 11 12
MONITOR JACK
J401
LOWER REAR OF RADIO TRANSMITTER
TERMINAL BOARD "A"
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
CABLE "B"
INSTALL TERMINAL TUBE NAVY SIZE "E"
INSTALL TERMINAL TUBE NAVY SIZE "F"
115 V d-c SUPPLY
115 V a-c SUPPLY
INSTALL TERMINAL TUBE NAVY SIZE "J"
INSTALL TERMINAL TUBE NAVY SIZE "F"
CABLE "A"
CABLE "D"
CABLE "C"
1/8" PIPE THREAD
VALVE
(SCHRAEDER CAT NO 645)
END SEAL
SHIELD
DETAIL
GAS ENTRANCE VALVE & END SEAL ASSEMBLY
OUTER TUBING OF TRANSMISSION LINE
RUBBER PACKING GASKET
GASKET CONTACT SPRING
CYLINDRICAL SHEATH
CERAMIC INSULATOR
OUTER COUPLING SLEEVE
COUPLING NUT
INNER COUPLING PIN
(NOTE THAT SHOULDER IS NOT CENTERED)
INNER CONDUCTOR OF TRANSMISSION LINE
ANCHOR JOINT ASSEMBLY
CYLINDRICAL SHEATH
RUBBER PACKING GASKET
COUPLING NUT
INNER CONDUCTOR OF TRANSMISSION LINE
INNER COUPLING PIN
OUTER CONDUCTOR SLEEVE COUPLING
SPACING INSULATOR
OUTER CONDUCTOR OF TRANSMISSION LINE
PACKING GASKET CONTACT SPRING
RUBBER PACKING GASKET
SOLDERLESS COUPLING ASSEMBLY
ANTENNA ASSEMBLY
TYPE CWS-66037
TERMINAL BOARD "H"
1 2 3 4 5 6 7 8
CABLE "D"
RADIO TRANSMITTER
TYPE CWS-52244
TERMINAL BOARD "A"
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
TO L-F FREQ. METER
OUTPUT INPUT
CABLE "B"
CABLE "C"
TO 115 V. A.C. SUPPLY
CABLE "C"
TO 115 V D.C. SUPPLY
CABLE "A"
ANTENNA CONTROL UNIT
TYPE CWS-23271
TERMINAL BOARD "G"
12 11 10 9 8 7 6 5 4 3 2 1
CENTER CONDUCTOR EXTENDS 1/8 INCH INTO CENTER TERMINAL OF CONNECTOR PLUG.
CABLE CLAMPED FOR POSITIVE GROUND BRAID SOLDERED TO CLAMP
31 LG.
FLUSH SET SCREW
.410
.290
P601 B
FLEXIBLE TRANSMISSION LINE
7/26 CENTER CONDUCTOR LEAD
COPALENE "B" RESIN INSULATION
TINNED COPPER BRAID
VINAL JACKET
P601A
SAME AS P601B
FREQUENCY METER CO-AXIAL CABLE
OUTER CONDUCTOR
OUTSIDE DIAMETER 7/8 INCH
OUTSIDE DIAMETER 1/4 IN
INNER CONDUCTOR
TRANSMISSION LINE

INTERCONNECTING CABLE REQUIREMENTS

DESIGNATION THIS DWG.	NUMBER OF CABLES USED	NAVY TYPE NUMBER	NUMBER OF ACTIVE WIRES	NUMBER OF SPARE WIRES
CABLE "A"	1	MHFA-10	7	3
CABLE "B"	1	MHFA-4	4	0
CABLE "C"	2	THFA-4	2	1
CABLE "D"	1	MHFA-10	6	4
CABLE "E"	1	REFER TO ASSEMBLY DWG. FIG. 25		

NOTE:- CABLES A, B, C & D ARE NOT SUPPLIED WITH THIS EQUIP.

Figure 39—Model YG-1 Equipment
(Interconnections and Cable Identification, T-620783)

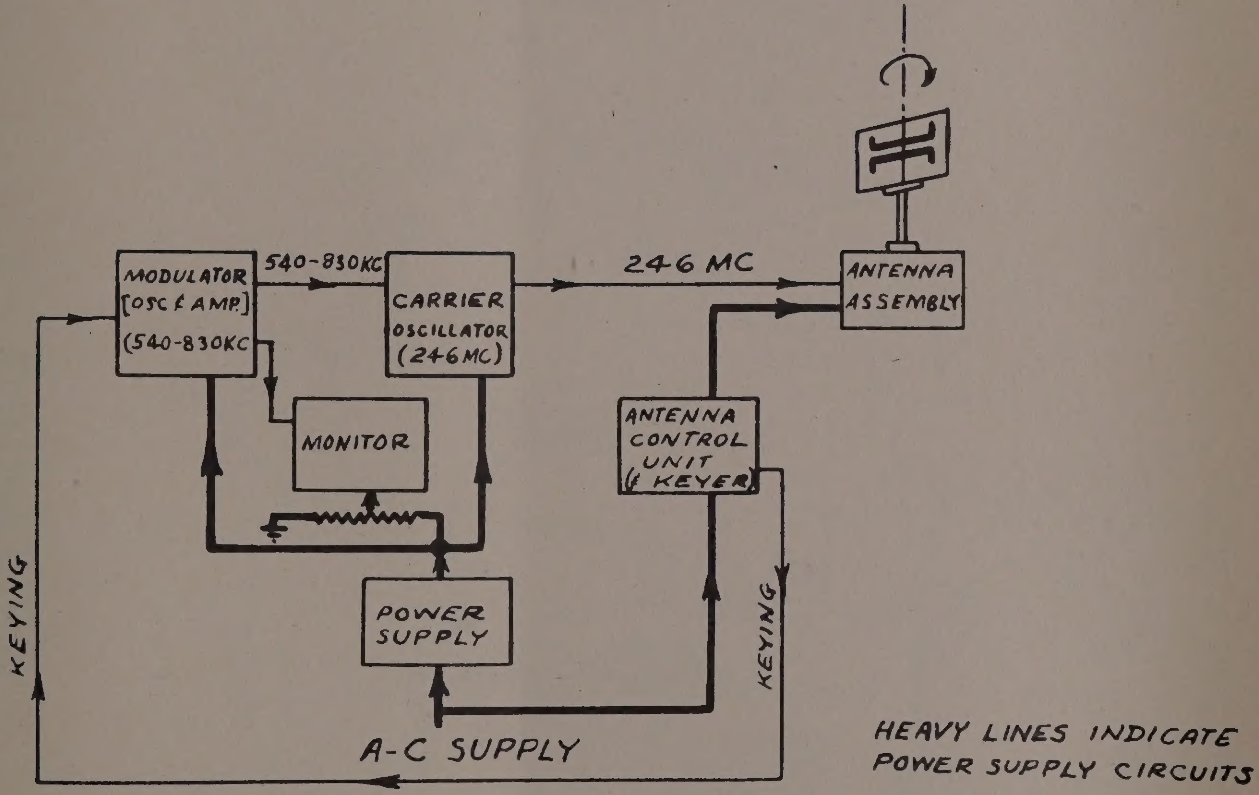
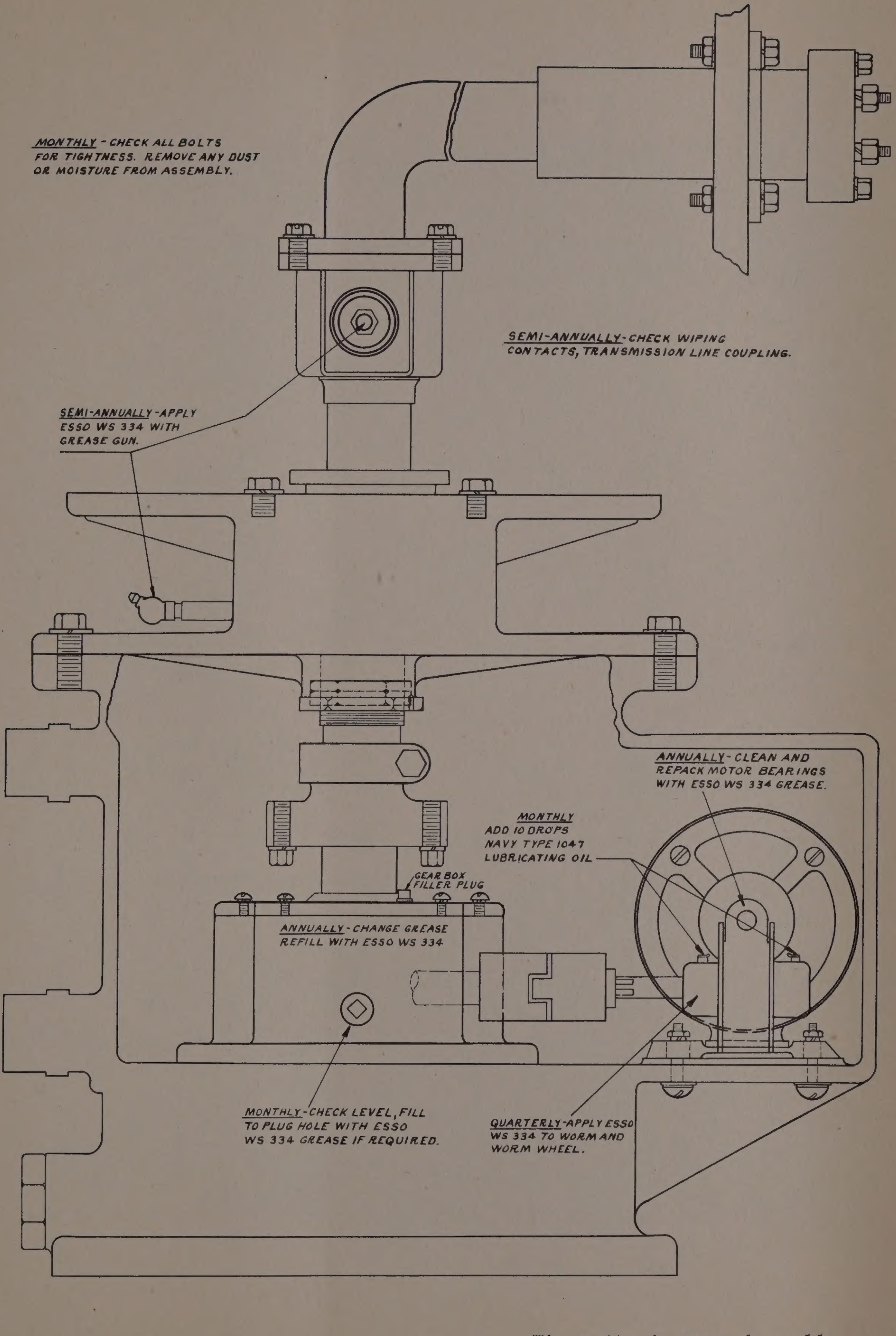

MODULATOR
[OSC & AMP.]
(540-830KC
540-830KC
CARRIER
OSCILLATOR
(246MC)
246 MC
ANTENNA
ASSEMBLY
MONITOR
ANTENNA
CONTROL
UNIT
(& KEYER)
POWER
SUPPLY
KEYING
KEYING
A-C SUPPLY
HEAVY LINES INDICATE
POWER SUPPLY CIRCUITS

Figure 40—Model YG-1 Equipment (Functional Block Diagram, K-875646)



MONTHLY - CHECK ALL BOLTS FOR TIGHTNESS. REMOVE ANY DUST OR MOISTURE FROM ASSEMBLY.

SEMI-ANNUALLY - CHECK WIPING CONTACTS, TRANSMISSION LINE COUPLING.

SEMI-ANNUALLY - APPLY ESSO WS 334 WITH GREASE GUN.

ANNUALLY - CLEAN AND REPACK MOTOR BEARINGS WITH ESSO WS 334 GREASE.

MONTHLY ADD 10 DROPS NAVY TYPE 1047 LUBRICATING OIL

ANNUALLY - CHANGE GREASE REFILL WITH ESSO WS 334

MONTHLY - CHECK LEVEL, FILL TO PLUG HOLE WITH ESSO WS 334 GREASE IF REQUIRED.

QUARTERLY - APPLY ESSO WS 334 TO WORM AND WORM WHEEL.

Figure 41—Antenna Assembly (Service and Maintenance Diagram P-721516)

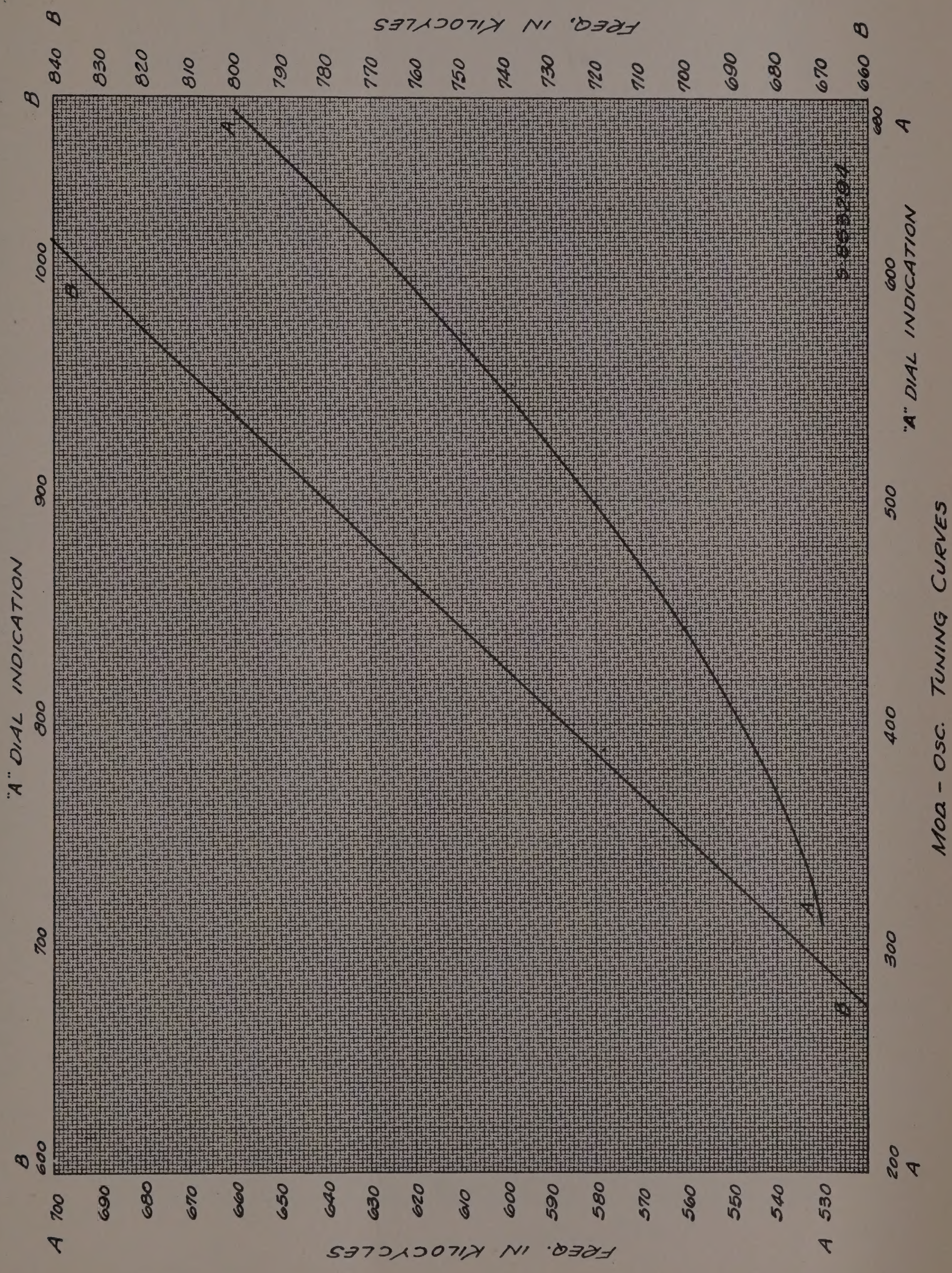


Figure 42—Modulator-Oscillator Tuning (Curves, S-853294)

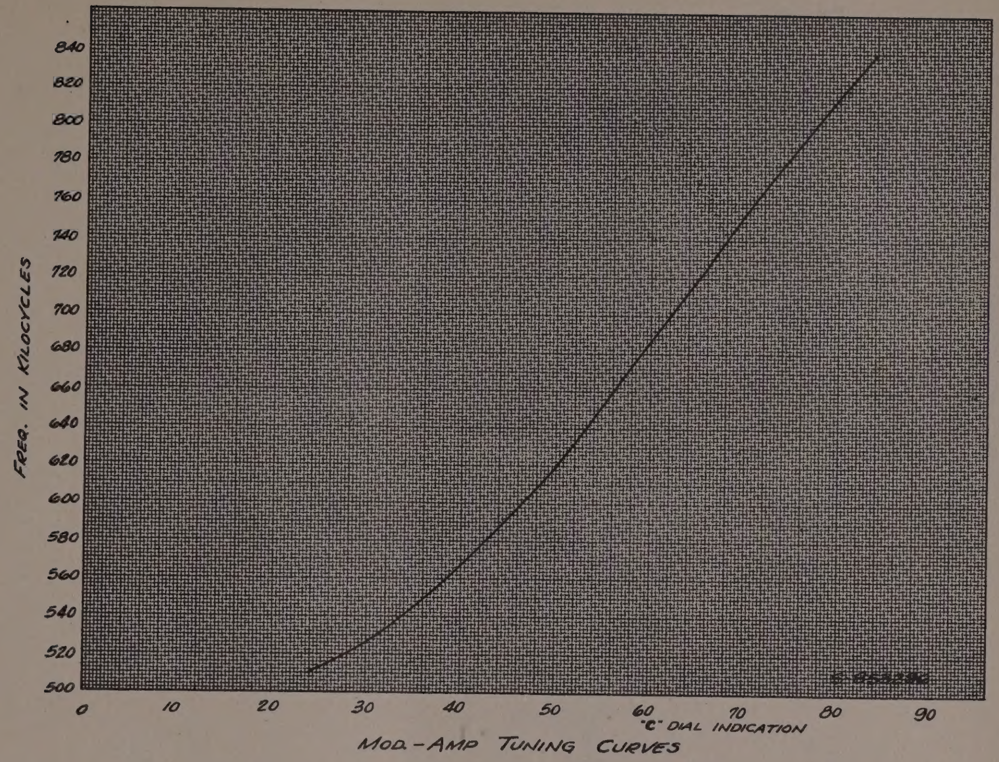


Figure 43—*Modulator-Amplifier Tuning* (*Curves, S*-853296)

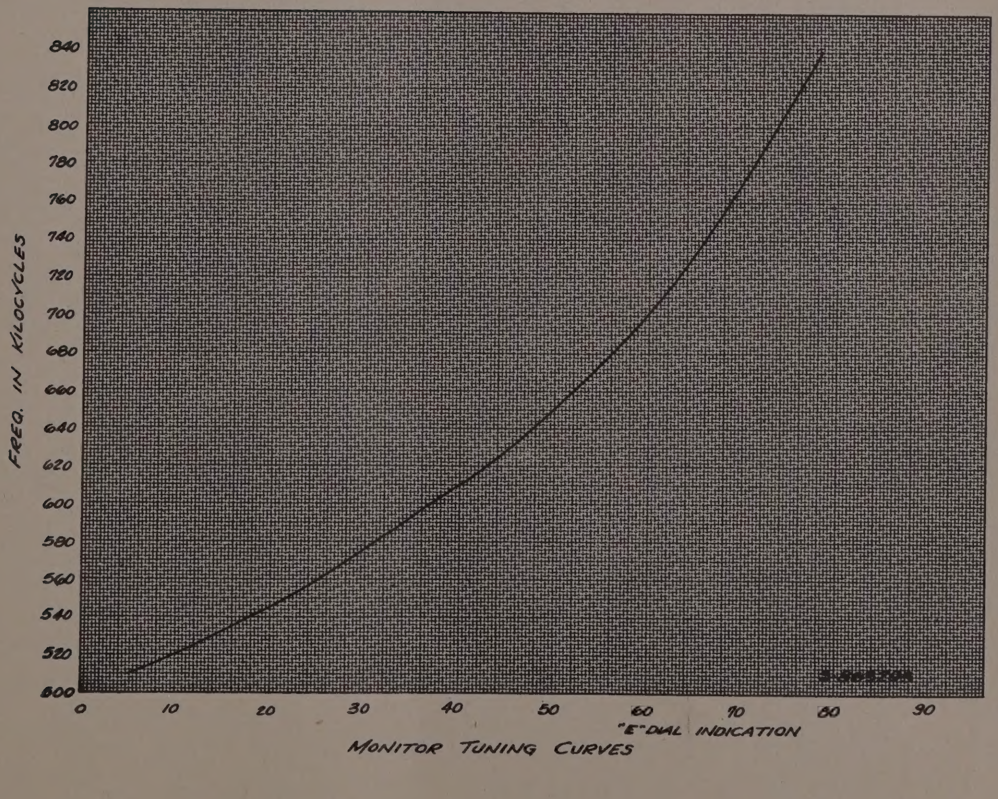
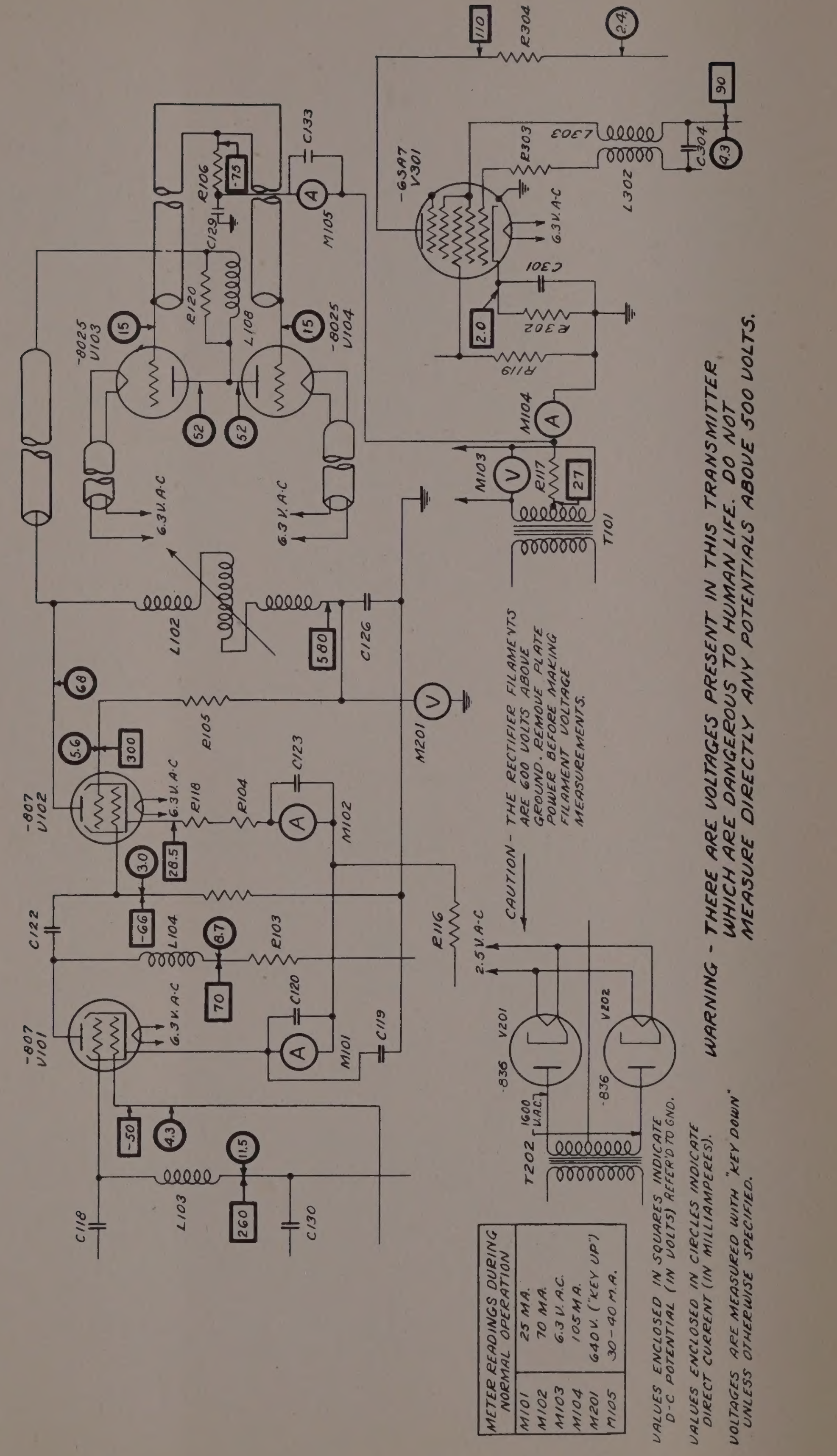


Figure 44—*Monitor Tuning* (*Curves, S*-853295)


-807 V101
-807 V102
-8025 V103
-8025 V104
-6SA7 V301
-836 V201
-836 V202
T202
1600 V.A.C.
T101
C118
C119
C120
C122
C123
C126
C129
C130
C133
C301
C304
L102
L103
L104
L108
L302
L303
R103
R104
R105
R106
R116
R117
R118
R119
R120
R302
R303
R304
M101
M102
M103
M104
M105
M201
6.3 V.A-C
2.5 V.A-C
260
11.5
-50
4.3
70
8.7
-66
3.0
28.5
300
5.6
68
580
52
52
15
15
-73
27
2.0
90
4.3
110
2.4

METER READINGS DURING NORMAL OPERATION	
M101	25 MA.
M102	70 MA.
M103	6.3 V.A.C.
M104	105 MA.
M201	640 V. ("KEY UP")
M105	30-40 M.A.

VALUES ENCLOSED IN SQUARES INDICATE D-C POTENTIAL (IN VOLTS) REFER'D TO GND.

VALUES ENCLOSED IN CIRCLES INDICATE DIRECT CURRENT (IN MILLIAMPERES).

VOLTAGES ARE MEASURED WITH "KEY DOWN" UNLESS OTHERWISE SPECIFIED.

CAUTION - THE RECTIFIER FILAMENTS ARE 600 VOLTS ABOVE GROUND. REMOVE PLATE POWER BEFORE MAKING FILAMENT VOLTAGE MEASUREMENTS.

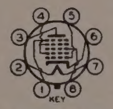
WARNING - THERE ARE VOLTAGES PRESENT IN THIS TRANSMITTER WHICH ARE DANGEROUS TO HUMAN LIFE. DO NOT MEASURE DIRECTLY ANY POTENTIALS ABOVE 500 VOLTS.

Figure 45—Radio Transmitter Voltages and Currents (Simplified Schematic, M-422862)

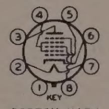
6SA7, 6SA7-GT/G
PENTAGRID CONVERTER

	6SA7	6SA7-GT/G	
Heater■	Coated Unipotential Cathode		
Voltage	6.3		a-c or d-c volts
Current	0.3		amp.
Direct Interelectrode Cap. ←			
Grid #3 to All Other Electrodes (R-F Input)	9.5▲	11	μμf
Plate to All Other Electrodes (Mixer Output)	12▲	11	μμf
Grid #1 to All Other Electrodes (Osc. Input)	7▲	8	μμf
Grid #3 to Plate	0.13 max.▲	0.5 max.▲▲	μμf
Grid #3 to Grid #1	0.15 max.▲	0.4 max.▲▲	μμf
Grid #1 to Plate	0.06 max.▲	0.2 max.▲▲	μμf
Grid #1 to Shell and All Other Electrodes except Cathode	4.4	5	μμf
Grid #1 to Cathode	2.6	3	μμf
Cathode to Shell and All Other Electrodes except Grid #1	5	14	μμf
Maximum Overall Length	2-5/8"	3-5/16"	
Maximum Seated Height	2-1/16"	2-3/4"	
Maximum Diameter	1-5/16"	1-5/16"	
Bulb	Metal Shell MT-8	T-9	
Base ←	Small Wafer Octal 8-Pin	Intermed. Sh. Octal 8-Pin	

Pin 1 { 6SA7, Shell
6SA7-GT/G, No Conn.
Pin 2 - Heater
Pin 3 - Plate
Pin 4 - Grids #2 & #4
Pin 5 - Grid #1
Pin 6 - Cathode
Pin 7 - Heater
Pin 8 - Grid #3



BOTTOM VIEW (8R)



BOTTOM VIEW (GT-8AD)

Mounting Position Any

Maximum and Minimum Ratings Are Design-Center Values

CONVERTER SERVICE

Plate Voltage	300 max.	volts
Grids #2 & #4 Voltage	100 max.	volts
Grids #2 & #4 Supply Voltage	300 max.	volts
Grid #3 Voltage †	0 min.	volts
Plate Dissipation	1.0 max.	watt
Screen Dissipation	1.0 max.	watt
Total Cathode Current	14 max.	ma.

■ In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.
▲ With shell connected to cathode.
▲▲ With external shield connected to cathode.
† For self-excited oscillator.

← Indicates a change.

6SA7, 6SA7-GT/G
PENTAGRID CONVERTER

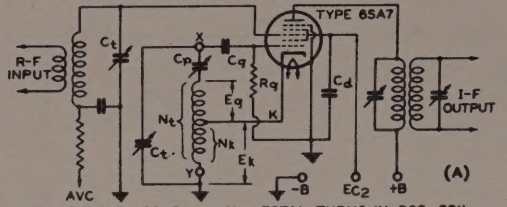
(continued from preceding page)

Characteristics:	*Self-excitation**		*Separate Excitation*		
Plate Voltage	100	250	100	250	volts
Grids #2 & #4 Volt.	100	100	100	100	volts
Grid #3 (Control) Volt.	0	0	-2	-2	volts
Grid #1 Resistor	20000	20000	20000	20000	ohms
Plate Res. (Approx.)	0.5	1.0	0.5	1.0	megohm
Conversion Transcond.	425	450	425	450	μmhos
Conversion Transcond. (Approx.) ‡	2	2	2	2	μmhos
Plate Current	3.3	3.5	3.3	3.5	ma.
Grids #2 & #4 Current	8.5	8.5	8.5	8.5	ma.
Grid #1 Current	0.5	0.5	0.5	0.5	ma.
Total Cathode Current	12.3	12.5	12.3	12.5	ma.

NOTE: The transconductance between Grid #1 and Grids #2 & #4 connected to plate (not oscillating) is approximately 4500 μmhos under the following conditions: Grids #1, #3, and shell at 0 volts; Grids #2 & #4 and plate at 100 volts.

* Characteristics are approximate only and are shown for a Hartley circuit with a feedback of approximately 2 volts peak in the cathode circuit.
‡ With Grid #3 bias of -35 volts.

TYPICAL SELF-EXCITED CONVERTER CIRCUIT FOR TYPE 6SA7



Cd = BY-PASS COND.
Cq = 50 μμf
Cp = PADDING COND.
Ct = TUNING COND.
Nt = TOTAL TURNS IN OSC. COIL
Nk = TURNS IN CATHODE SECTION OF OSC. COIL
Rq = 20000 OHMS

CE-4992

The license extended to the purchaser of tubes appears in the License Notice accompanying them. Information contained herein is furnished without assuming any obligations.

836

HALF-WAVE HIGH-VACUUM RECTIFIER

Heater	Coated Unipotential Cathode*		
Voltage	2.5	a-c volts	
Current	5.0	amp.	
Maximum Overall Length	6-9/16"		←
Maximum Diameter	2-7/16"		
Bulb	ST-19		
Cap	Medium Metal		
Base	Medium 4-Pin Bayonet		
RCA Socket	Type UR-542-A		←
Operating Conditions:			
Peak Inverse Voltage	5000 max.	volts	
Peak Plate Current	1.0 max.	amp.	
Average Plate Current	0.25 max.	amp.	

* The cathode should be allowed to come up to operating temperature before plate current is drawn from the tube. For average conditions the delay is approximately 40 seconds.

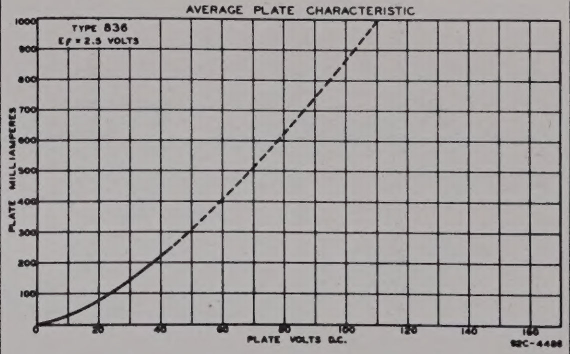
The cathode is connected within the tube to one side of the heater. If the heaters of two or more 836's are to be operated in parallel, the corresponding cathode leads must be connected together; likewise, the corresponding heater leads. ←

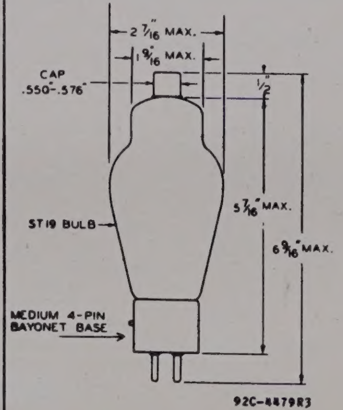
← Indicates a change.

836

HALF-WAVE HIGH-VACUUM RECTIFIER

(continued from preceding page)




2 7/16" MAX.
1 9/16" MAX.
CAP .550"-.576"
1/2"
5 7/16" MAX.
6 9/16" MAX.
ST19 BULB
MEDIUM 4-PIN BAYONET BASE
92C-4479R3

TUBE MOUNTING POSITION
VERTICAL or HORIZONTAL

TUBE SYMBOL & TOP VIEW
OF
SOCKET CONNECTIONS

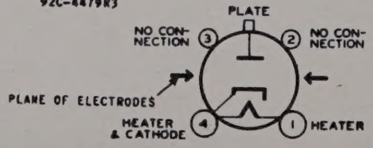


PLATE
NO CON-NECTION
3
2
NO CON-NECTION
PLANE OF ELECTRODES
HEATER & CATHODE
4
1
HEATER

TRANSMITTING BEAM POWER AMPLIFIER

Heater⊙	Coated Unipotential Cathode	
Voltage	6.3	a-c or d-c volts
Current	0.9	amp.
Transconductance for plate current of 72 ma.	6000 approx.	µmhos
Direct Interelectrode Capacitances:		
Grid to Plate (With external shielding)	0.2 max.	µµf
Input	11	µµf
Output	7	µµf
Maximum Overall Length		5-3/4"
Maximum Diameter		2-1/16"
Bulb		ST-16
Cap		Small Metal
Base		Medium 5-Pin, "Micanol"

MAXIMUM CCS and ICAS RATINGS with TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service
ICAS = Intermittent Commercial and Amateur Service

A-F POWER AMPLIFIER & MODULATOR - Class AB_2#

	CCS	ICAS	
D-C Plate Voltage	600 max.	750 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	300 max.	volts
Max.-Signal D-C Plate Cur.*	120 max.	120 max.	ma.
Max.-Signal Plate Input*	60 max.	90 max.	watts
Screen Input*	3.5 max.	3.5 max.	watts
Plate Dissipation*	25 max.	30 max.	watts

Typical Operation:
Unless otherwise specified, values are for 2 tubes

D-C Plate Voltage	400	500	600	750	volts
D-C Screen Voltage	300	300	300	300	volts
D-C Grid Voltage (Fixed bias, Grid #1)	-25	-25	-30	-32	volts
Peak A-F Grid-to-Grid Voltage	80	80	80	95	volts
Zero-Sig. D-C Plate Cur.	100	100	60	60	ma.
Max.-Sig. D-C Plate Cur.	230	230	200	240	ma.
Max.-Sig. D-C Screen Cur.	10	10	10	10	ma.
Load Resistance (Per tube)	950	1165	1665	1830	ohms
Effective Load Resistance (Plate to plate)	3800	4660	6660	7320	ohms
Peak Grid Input Power°	0.35	0.6	0.4	0.5	watt
Max.-Sig. Power Output**	60	75	80	120	watts

⊙ In circuits where the cathode is not directly connected to the heater, the potential difference between them should not exceed 100 volts. Under the maximum plate and screen dissipation conditions, the heater voltage should not fluctuate so that it exceeds 7.0 volts.
Subscript 2 indicates that grid current flows during some part of input cycle.
* Averaged over any audio-frequency cycle of sine-wave form.
° **: See next page.

TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

R-F POWER AMPLIFIER - Class B Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	ICAS	
D-C Plate Voltage	600 max.	750 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	300 max.	volts
D-C Plate Current	80 max.	90 max.	ma.
Plate Input	37.5 max.	45 max.	watts
Screen Input	2.5 max.	2.5 max.	watts
Plate Dissipation	25 max.	30 max.	watts

Typical Operation:

D-C Plate Voltage	400	500	600	750	volts
D-C Screen Voltage	250	250	250	300	volts
D-C Grid Volt. (Grid #1) †	-25	-25	-25	-35	volts
Peak R-F Grid Voltage	30	30	20	27	volts
D-C Plate Current	75	75	62.5	60	ma.
D-C Screen Current	4	4	3	3	ma.
D-C Grid Cur. (Approx.)	0	0	0	0	ma.
Driving Power (Approx.).°°	0.25	0.25	0.2	0.12	watt
Power Output (Approx.)	9	12.5	12.5	15	watts

°° At crest of a-f cycle with modulation factor of 1.0.

PLATE-MODULATED R-F POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube for use with a max. modulation fact. of 1.0

	CCS	ICAS	
D-C Plate Voltage	475 max.	600 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	300 max.	volts
D-C Grid Voltage (Grid #1)	-200 max.	-200 max.	volts
D-C Plate Current	83 max.	100 max.	ma.
D-C Grid Current	5 max.	5 max.	ma.
Plate Input	40 max.	60 max.	watts
Screen Input	2.5 max.	2.5 max.	watts
Plate Dissipation	16.5 max.	25 max.	watts

Typical Operation:

D-C Plate Voltage	325	400	475	600	volts
D-C Screen Voltage ◇	225	225	225	275	volts
	10000	16000	25000	35000	ohms
D-C Grid Voltage ▲ †	-45	-50	-50	-78	volts
	5000	10000	10000	15000	ohms
	300	300	300	300	ohms
Peak R-F Grid Voltage	70	70	70	100	volts
D-C Plate Current	80	80	83	100	ma.
D-C Screen Current	9	9	9	9	ma.

° Driver stage should be capable of supplying the grids of the class AB_2 stage with the specified peak values at low distortion. The effective resistance per grid circuit of the class AB_2 stage should be kept below 500 ohms and the effective impedance at the highest desired response frequency should not exceed 700 ohms.
◇ Obtained preferably from modulated plate supply through voltage-dropping resistor of value shown.
▲ Obtained preferably from grid resistor (5000, 10000, 15000) although combination of either grid resistor and cathode resistor (300) or grid resistor and fixed supply may be used.
**, †: See next page.

TRANSMITTING BEAM POWER AMPLIFIER

(continued from preceding page)

	CCS			ICAS	
D-C Grid Current (Approx.)	3	3	2	2	ma.
Driving Power (Approx.)	0.2	0.2	0.1	0.1	watt
Power Output (Approx.)	15	19	24	37.5	watts

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation##

	CCS	ICAS	
D-C Plate Voltage	600 max.	750 max.	volts
D-C Screen Voltage (Grid #2)	300 max.	300 max.	volts
D-C Grid Voltage (Grid #1)	-200 max.	-200 max.	volts
D-C Plate Current	100 max.	100 max.	ma.
D-C Grid Current	5 max.	5 max.	ma.
Plate Input	60 max.	75 max.	watts
Screen Input	3.5 max.	3.5 max.	watts
Plate Dissipation	25 max.	30 max.	watts

Typical Operation:

D-C Plate Voltage	400	500	600	750	volts
D-C Screen Voltage §	250	250	250	250	volts
	17000	28000	39000	55000	ohms
D-C Grid Voltage □ †	-50	-50	-50	-50	volts
	20000	25000	16700	16900	ohms
	470	470	450	450	ohms
Peak R-F Grid Voltage	80	80	80	80	volts
D-C Plate Current	95	95	100	100	ma.
D-C Screen Current	9	9	9	8	ma.
D-C Grid Cur. (Approx.)	2.5	2	3	3	ma.
Driving Power (Approx.)	0.18	0.14	0.22	0.22	watt
Power Output (Approx.)	25	30	37.5	50	watts

** With zero-impedance driver and perfect regulation, plate-circuit distortion does not exceed 2%. In practice, plate-voltage regulation, screen-voltage regulation, and grid-bias regulation, should not be greater than 5%, 5%, and 3%, respectively.
† The total effective grid-circuit resistance should not exceed 25000 ohms.
Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.
§ Obtained from separate source, from a potentiometer, or from plate supply through a series resistor of value shown.
□ Obtained from fixed supply, by grid resistor (20000, 25000, 16700, 16900), by cathode resistor (470, 450), or by combination methods.

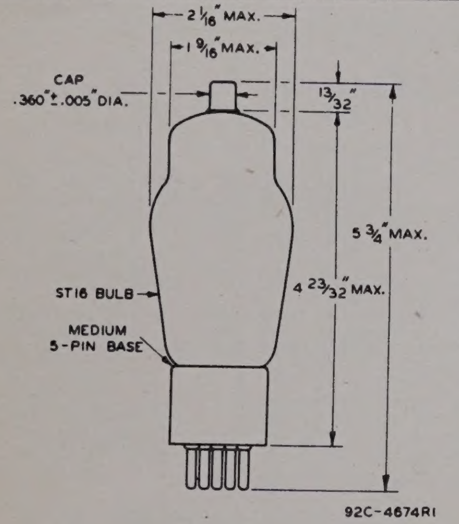
HIGH-FREQUENCY OPERATION

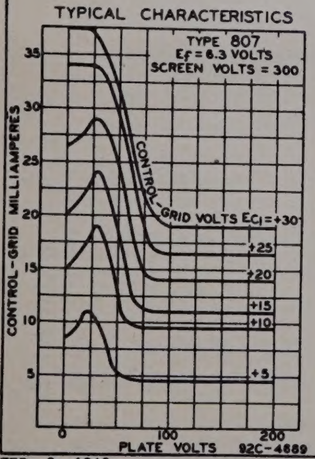
Maximum permissible percentage of maximum rated plate voltage and plate input

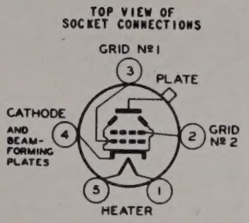
FREQUENCY (Mc)		60	80	125
TELEPHONY	Class C	100	90	75
	Class C, Plate-Mod.	100	80	55
TELEGRAPHY - Class C		100	80	55

807

TRANSMITTING BEAM POWER AMPLIFIER


2 1/16" MAX.
1 9/16" MAX.
CAP
.360"±.005" DIA.
13/32"
5 3/4" MAX.
4 23/32" MAX.
ST16 BULB
MEDIUM
5-PIN BASE
92C-4674R1




TOP VIEW OF
SOCKET CONNECTIONS
GRID Nº1
PLATE
GRID Nº2
CATHODE
AND
BEAM-
FORMING
PLATES
HEATER
1
2
3
4
5

MOUNTING POSITION

VERTICAL: Base down.
HORIZONTAL: No.

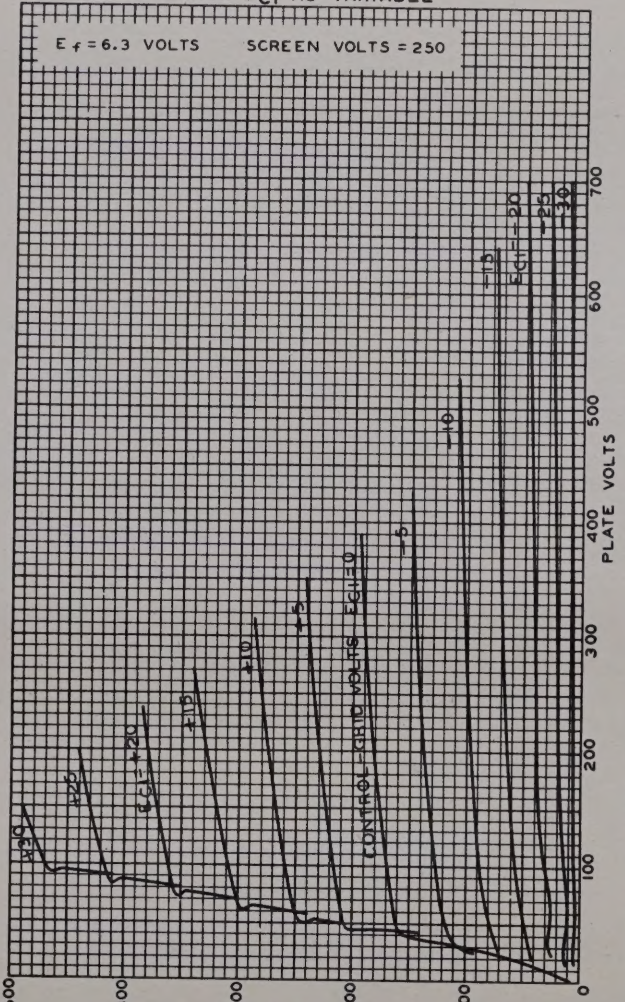
FEB. 2, 1940

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

DATA 2

807

AVERAGE PLATE CHARACTERISTICS
WITH E_{C1} AS VARIABLE



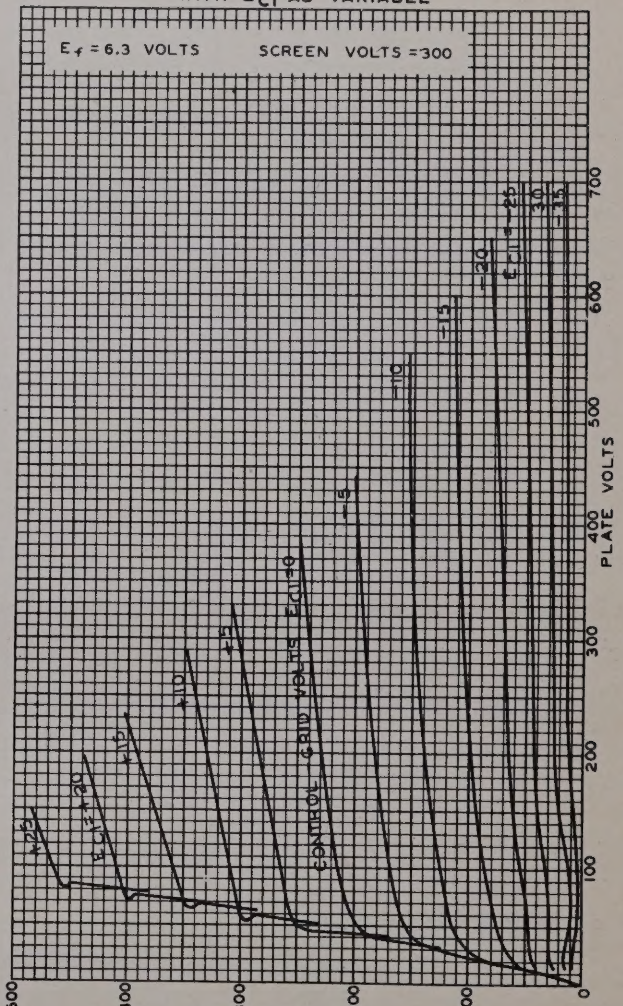
OCT. 21, 1936

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4676

807

AVERAGE PLATE CHARACTERISTICS
WITH E_{C1} AS VARIABLE



OCT. 23, 1936

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-4682

ULTRA·HIGH·FREQUENCY TRANSMITTING TRIODE

8025

The 8025 is a three-electrode transmitting tube designed especially for use as an oscillator, r-f power amplifier, and frequency multiplier at the ultra-high frequencies. It has high perveance and low transit time. *The tube may be operated at maximum ratings at frequencies as high as 500 megacycles and at reduced ratings at higher frequencies.* Maximum plate dissipation of the tube is 40 watts for class C telegraph service. At 600 megacycles, a pair of these tubes has a power output capability of about 25 watts with an efficiency of approximately 35 per cent.

The thoriated-tungsten filament of the 8025 is of the double-helical type, and is center-tapped within the tube to minimize the effects of filament-lead inductance. The short, heavy, double plate and grid leads are brought out of the tube through individual seals. These heavy, double leads reduce lead inductance and eliminate within the tube common impedances between the tank and neutralizing circuits.

TENTATIVE CHARACTERISTICS and RATINGS

FILAMENT VOLTAGE (A.C. or D.C.)	6.3	Volts
FILAMENT CURRENT	2.0	Amperes
AMPLIFICATION FACTOR	18	

MAXIMUM CCS RATINGS and TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service

As Grid-Modulated R-F Power Amplifier - Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C PLATE VOLTAGE	1000	*max.*	Volts
D-C GRID VOLTAGE	-200	*max.*	Volts
D-C PLATE CURRENT	65	*max.*	Ma.
PLATE INPUT	50	*max.*	Watts
PLATE DISSIPATION	40	*max.*	Watts
TYPICAL OPERATION:			
D-C Plate Voltage	1000		Volts
D-C Grid Voltage	-135		Volts
Peak R-F Grid Voltage	155		Volts
Peak A-F Grid Voltage	65		Volts
D-C Plate Current	50		Ma.
D-C Grid Current (Approx.)**	4		Ma.
Driving Power (Approx.)** o	3.5		Watts
Power Output (Approx.)	20		Watts

As Plate-Modulated R-F Power Amplifier-- Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C PLATE VOLTAGE	800	*max.*	Volts
D-C GRID VOLTAGE	-200	*max.*	Volts
D-C PLATE CURRENT	65	*max.*	Ma.
D-C GRID CURRENT	20	*max.*	Ma.
PLATE INPUT	33	*max.*	Watts
PLATE DISSIPATION	27	*max.*	Watts
TYPICAL OPERATION:			
D-C Plate Voltage	800		Volts
D-C Grid Voltage	-105		Volts
From a grid resistor of	10000		Ohms
Peak R-F Grid Voltage	145		Volts
D-C Plate Current	40		Ma.
D-C Grid Current (Approx.)**	10.5		Ma.
Driving Power (Approx.)**	1.4		Watts
Power Output (Approx.)	22		Watts

As R-F Power and Oscillator - Class C Telegraphy

Key-down conditions per tube without modulation ##

D-C PLATE VOLTAGE	1000	*max.*	Volts
D-C GRID VOLTAGE	-200	*max.*	Volts
D-C PLATE CURRENT	80	*max.*	Ma.
D-C GRID CURRENT	20	*max.*	Ma.
PLATE INPUT	50	*max.*	Watts
PLATE DISSIPATION	40	*max.*	Watts
TYPICAL OPERATION:			
D-C Plate Voltage	1000		Volts
D-C Grid Voltage:			
From a fixed supply of	-90		Volts
From a grid resistor of	6400		Ohms
From a cathode resistor of	1400		Ohms
Peak R-F Grid Voltage	130		Volts
D-C Plate Current	50		Ma.
D-C Grid Current (Approx.)**	14		Ma.
Driving Power (Approx.)**	1.6		Watts
Power Output (Approx.)	35		Watts

* Grid voltages are given with respect to the mid-point of filament operated on a.c. If d.c. is used, each stated value of grid voltage should be decreased by one-half the filament voltage and the circuit returns made to the negative end of the filament.

o At crest of audio-frequency cycle with modulation factor of 1.0.

Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

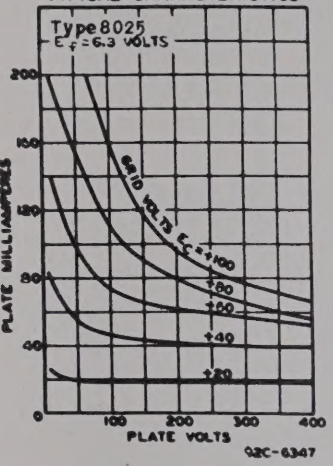
** Subject to wide variations depending on the impedance of the load circuit. High-impedance load circuits require more grid current and driving power to obtain the desired output. Low-impedance circuits need less grid current and driving power, but plate circuit efficiency is sacrificed. The driving stage should be capable of delivering considerably more than the required driving power.

INSTALLATION

The 8025 should be installed to operate in a vertical position.

Connections to the grid and plate terminals must be flexible enough so that normal expansion will not place a strain on the glass at the seals, yet heavy enough to carry the high circulating r-f current. The tube terminal tips should not be used to support circuit parts unless such parts are extremely light and impose no strains on the tube terminals.

TYPICAL CHARACTERISTICS



The *bulb* becomes very hot during continuous operation of the tube so that free circulation of air around the tube should be provided. The installation of all wires and connections should be made so that they will not be close to or touch the bulb, in order to avoid puncture of the glass due to peak voltage effects.

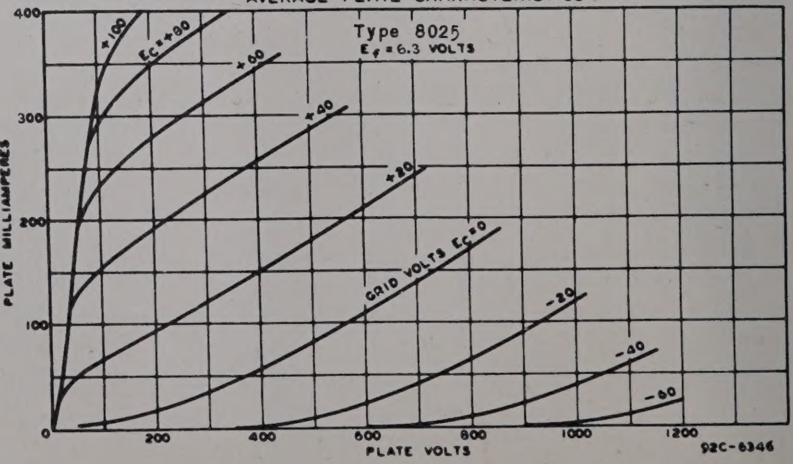
The *thoriated-tungsten filament* of the 8025 is center-tapped within the tube. The center lead is brought out to a separate connection. With this design, it is possible to minimize the effect of filament-lead inductance by connecting all three leads in parallel through by-pass condensers. The center lead of this parallel connection should not be returned directly to the center tap of the filament-transformer winding or to ground, although it may be by-passed to either of these points if desired. The filament voltage should not vary more than ± 5% from the rated value; otherwise a loss of emission may result. It is recommended that, in intermittent operation where the average number of transmissions is greater than 100 per day, the filament be maintained at 80% of normal voltage during standby periods. If the number of transmissions is less than 100 per day, the filament power may be either removed or maintained, whichever is preferred. However, in such applications as amateur service where the average number of transmissions is usually not greater than 100 and where the standby periods are usually no longer than the transmission periods, the filament voltage may be maintained at normal value during standby periods. The filament should be operated at constant voltage rather than constant current.

Overheating of the 8025 by severe overload may decrease the filament emission. The filament activity can sometimes be restored by operating the filament at rated voltage for ten minutes or more with no voltage on plate or grid. This process may be accelerated by raising the filament voltage to 7.5 volts (not higher) for a few minutes. The positive high-voltage supply lead should be provided with a protective device, such as a relay. This device should instantly remove the plate voltage when the d-c plate current reaches a value of 50% greater than normal.

The *plate* of the 8025 shows a dull red color at its maximum plate dissipation rating for each class of service.

R-F by-passing of the grid- and plate-return circuits should be made to the

AVERAGE PLATE CHARACTERISTICS



center lead of the filament. It is important that the returns be made to this common connection in order to avoid r-f interaction through common return circuits. In some applications, it may also be advisable to supplement the action of the by-pass condensers by r-f chokes placed close to the condensers in the voltage-supply leads.

In order that the maximum ratings given under CHARACTERISTICS will not be exceeded, changes in plate and filament voltages due to line-voltage fluctuation, load variation, and manufacturing variation of the associated apparatus must be determined. An average value of plate and filament voltages should then be chosen so that under the usual voltage variations the maximum rated voltages will not be exceeded.

When a new circuit is tried or when adjustments are made, the plate voltage should be reduced in order to prevent damage to the tube or associated apparatus in case circuit adjustments are incorrect. It is advisable to use a protective resistance of about 6000 ohms in series with the plate lead during such adjustments. *The rated plate voltage of this tube is high enough to be dangerous to the user. Care should be taken during the adjustment of circuits, especially when the exposed circuit parts are at high d-c plate potential.*

APPLICATION

In *grid-modulated class C telephone service*, the 8025 may be supplied with d-c grid bias from a cathode resistor, unby-passed for audio frequencies, or from a fixed supply. The audio power required in this service is very small. It need be only sufficient to meet the peak power requirement of the grid of the class C amplifier on the crest of the input signal. The actual peak value is generally never more than 3 watts.

In *plate-modulated class C r-f service*, the 8025 may be supplied with grid bias from a grid resistor, or from a combination of grid resistor with either fixed supply or cathode resistor. The cathode resistor should be suitably by-passed for both a.f. and r.f. The combination method has the advantage of not only protecting the tube from damage through loss of excitation but also of minimizing distortion by bias-supply compensation.

In *class C r-f telegraph service*, the 8025 may be supplied with grid bias by any convenient method. When the tube is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a safe value. If the 8025 is operated at the maximum rated plate voltage of 1000 volts, a fixed bias of at least -40 volts should be used.

The 8025 may be operated with maximum ratings at frequencies as high as 500 mc but as the frequency is raised, the efficiency and power output fall off. At 600 mc, an efficiency of about 35% can be expected. Since the efficiency at 600 mc is relatively low, the plate of the tube has been designed to have an unusually high dissipation rating. The 8025 may be operated at higher frequencies provided the maximum values of plate voltage and power input are reduced as the frequency is raised (other maximum ratings are the same as shown under CHARACTERISTICS). The table below shows the highest percentage of maximum plate voltage than can be used up to 600 mc. Special attention should be given to adequate ventilation of the 8025 at these frequencies. In cases where free circulation of air around the tube cannot be provided, forced-air cooling is recommended.

FREQUENCY	500	600	Mc
MAX. PERMISSIBLE PERCENTAGE of MAX. RATED PLATE VOLTAGE:			
class C telephony, grid-mod.	100	77	Per cent
class C telephony, plate-mod.	100	63	Per cent
class C telegraphy	100	63	Per cent

When the 8025 is operated at the ultra-high frequencies, push-pull operation is recommended. This connection has the advantage of simplifying the balancing of high-frequency circuits by providing symmetry of layout. In oscillator service, it is desirable to connect the two grid terminals and the two plate terminals of each tube in parallel in order to reduce their respective lead inductances.